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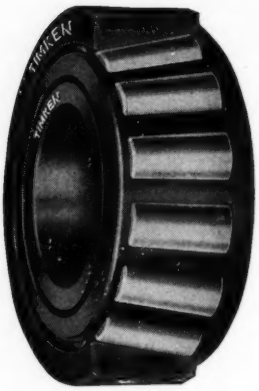

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Editorial Offices: 19 West 44th Street, New York

VOLUME XVII NUMBER TWO

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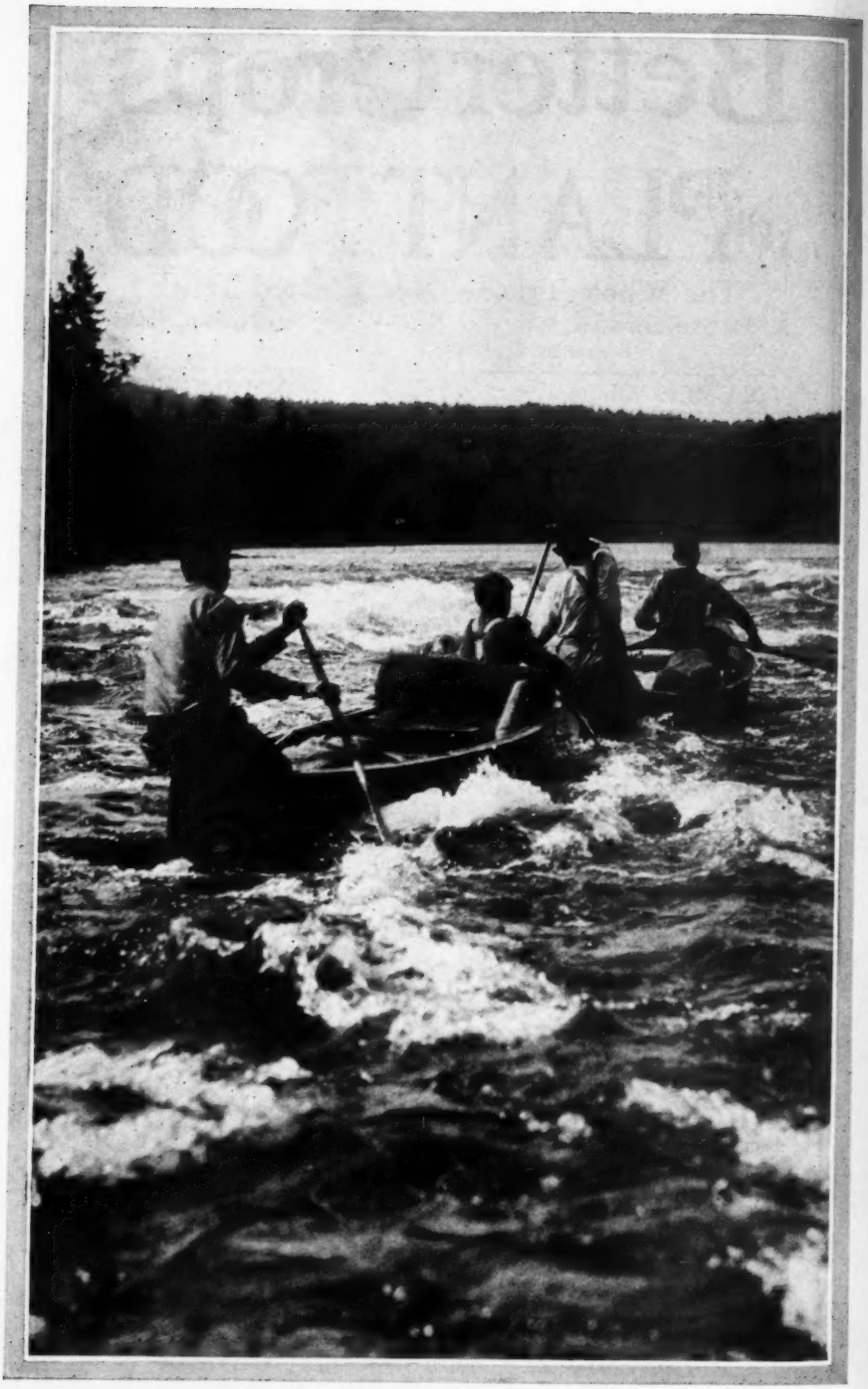

NATURE LOVERS FIND PLENTY OF THRILLS ON THE NIPIGON RIVER IN CANADA.

Better Crops with PLANT FOOD

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VOL. XVII NEW YORK, AUGUST, 1931 No. 2

Jeff says we have them in America

SACRED COWS

By Jeff McDermid

NO matter how emaciated or weakened a bovine may become in certain Oriental lands, she cannot be touched with curatives or put out of her misery because her carcass is sacred and her legendary standing is too great for interference.

Strange as it may seem, we rural-minded folks in America have our own sacred cows, and to approach them with a trocar or a syringe, or perhaps a dose of Epsom salts, is considered a threat against all the laws of the prophets.

So we turn them along the public highway of figurative speech and let them become the victims of mischance or abuse by agencies radically opposed to the "milk" of human kindness that might be found in the flowing udders ultimately. Or else we let some person or group milk these sacred cows right in our own barnyards, and maybe hold the pails for them while they are doing it. Then they churn the lactic booty into butter for their own johnny-cake.

When the agricultural colleges were founded, the main theme of American agriculture was production, abundant, cheap, and profuse. Economical lands

and growing population combined to hasten this theory, until the inventors of improved machinery and facilities caught up with the feverish farmers and showed them how to do more with less backache, and with fewer hired hands. Along with this movement for more food on the raw lands there came the indolent life of the metropolis, with large pay, more leisure, and much smaller appetites. The first speed forward soon felt the tempering effect of the second movement. Hence about a decade ago our colleges and farm leaders grudgingly admitted that the tune must be "production plus a profit," and when they failed to gauge the proper margin of profit as between the good and bad farmers, they fell back into the trenches with the slogan "stabilized production based on economy and market control." Here we find them today, a little bruised in battle, it is true, but hanging on with a determined confidence in the future —if nobody harms the aforesaid sacred cows or runs them too hard through the stinted pastures.

NOT so long ago a conference of farm leadership rallied at Chicago for a re-expression of support for the Federal Farm Board. Discussing details of that resolution or the causes for it is not herein proposed. It may or may not be a sacred cow of potential prepotency in agriculture. But in any event, the source of the trouble is not with the "head of the herd" but exists away down in the nether regions of the hinterlands, out in the far-off fields of local cooperation, out in the regions where the shibboleth of cooperation has become such a fetish that any corrective measures aimed at building true foundations are tabooed.

It is out where the rival leadership among the local ring-masters of cooperation keeps the whips singing around the ears of the confused proletariat, making them too timid or too prejudiced to swing into the general forward movement to make the utmost of the federal laws we possess already for farm organization.

It is not in Washington, D. C., or on the institute platforms that the reform movement will be accomplished to make the sacred cow of cooperation less an idol and more a producer. Those who aver that it is lack of cooperative education or cooperative mindedness which deters the national unity of thought and action in agriculture are only partly right. It is the stubborn provincial "meanness" and some local politics, glossed over with a modicum of sentimental reverence for the word "cooperation" which is hindering the Federal Farm Board and all other regional movements from coming to quick fruition.

IT exists in dairy organizations and in livestock shipping associations, and likewise in grain pools and other commodity marketing alignments. The reason is not so hard to find. Cooperation began as a local issue around some hamlet or trading center, some place with mutual assembling problems that grew in time to wider marketing vexations. Men with natural inclinations for bossing things assumed the rôle of leadership and direction as these movements grew.

The combination of personal power and political preferment went to their heads somewhat and they came to assume a proprietary air toward the community enterprises which they helped out at nativity. From the position of foster fathers they soon became guardians and Dutch uncles, pastoral heads of cooperative clans, jealous seers, and critical philosophers.

They criticised the early attempts of the colleges at getting on the bandwagon in the cooperative parade. They listened to Aaron Sapiro and other latter-day exponents of legal red-tape and judicial tactics, meanwhile keeping an eye on the cud-chewing bucolic bovine of their own home-raising—the sacred cow of the native pastures. They

(*Turn to page* 61)

He Did It This Year

After trying for 15 years, Cap'n Charlie Davis has succeeded in growing more than 100 barrels of early potatoes per acre

By G. Chalmers McDermid

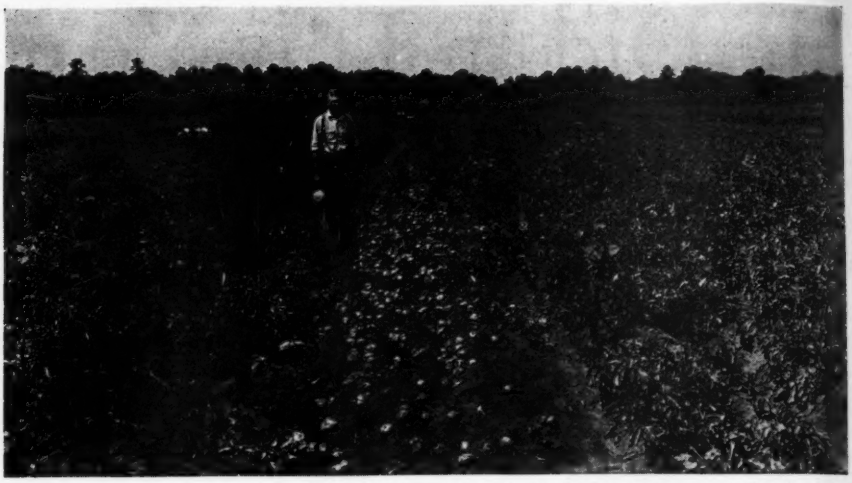
Windermere, Charleston,
South Carolina

Cap'n Charlie Davis says that potash did the trick.

WHAT a crop—10,807 barrels of potatoes from 107 acres, a yield of 101 barrels per acre! And it was made with a 7-7-10 fertilizer!

Now, good reader from the Northland, just keep your shirt on and listen to the rest of it. That's not much of a crop, maybe, for you folks who grow spuds in Maine, Pennsylvania, Wisconsin, Idaho, California, or some other potato States; but just ask any early potato grower from the Carolinas, Florida, Alabama, Mississippi, or "Loo Weezy Anna" whether or not he ever did it.

Cap'n Charlie Davis did it, down on Wadmalaw Island, near Charleston, on the South Carolina Coast—101 barrels of U. S. No. 1 potatoes per acre on 107 acres of good chocolate-colored sandy loam dirt. He'd been trying to make 100 barrels of "taters" per acre for his whole crop for 15 years, and this season his hopes were realized. But the real mean part of the whole works was that he made so little profit on the crop, because that old white potato market in early June was the



Photo—Courtesy, Horticultural Division, Clemson Agricultural College

Cap'n Davis in one of his potato fields which yielded 143 barrels of U. S. No. 1 potatoes per acre.

"orneriest" thing that ever was.

Cap'n Charlie was an old cotton planter before the boll-weevil came in, and he turned to potatoes because he found that he wasn't willing to divide his cotton crop in half—half for him and the other half for the weevil. Between Miss Patty, his good wife, and himself, they have managed to send three boys and three girls through college and the fourth boy is about ready to get his college course now.

To use the Cap'n's words, he'd been "messin' around" trying to find out why that good looking dirt wouldn't make more potatoes, and one day he, and his County Agent, and his fertilizer man got into a huddle, and figured out a fertilizer formula, doubling the potash. He made a trial of this analysis (7-7-10) and was "right well pleased." So well pleased was he, in fact, that the following February he ordered his whole fertil-

(*Turn to page* 54)

Note the young corn crop in the potato alley at Cap'n Charlie's left foot. Most potato growers in Coastal Carolina make a splendid crop of corn following the early potatoes.

Fertilizing the Apple Orchard

By R. D. L. Bligh, B. S. A.

Dominion Experimental Station, Kentville,
Nova Scotia

BORDEAUX mixture is made of a definite amount of lime and bluestone with a definite amount of water. These materials mixed in the right proportions make Bordeaux anywhere, anytime: all fruit growers know this. Many fruit growers think, or are tempted to believe, that orchard fertilization can be carried on by the same invariable formula, or because nitrogen increases the yield of fruit on trees in one orchard it will do so in all orchards in that neighborhood. Unfortunately these beliefs are not always true. The Bordeaux formula always works because it deals with inert materials which are always of the same chemical combination. But the soils in our orchards are not always the same in chemical constituents or alike in physical properties, and more important still, all apple trees are not alike even when growing in the same soil.

That is why sometimes an orchard fertilized with a nitrogenous fertilizer alone is extremely profitable or sometimes distinctly unprofitable. That is why Farmer Bill Jones swears by nitrogen only, and Farmer Bill Smith swears against nitrogen alone. Bill Brown, a neighboring farmer, scratches his head and wonders which is right. It is likely they are both right, but where does this leave Bill Brown? This is the problem that every farmer or fruit grower should solve for himself.

There are four ways in which fertilization may, at least theoretically, increase apple crops.

Four Reasons for Fertilizing

1. By increasing the size of the apples so that it takes fewer to fill a barrel. The effect of fertilizer on size of apples is variable. With moderate crops there is apparently at times an increase in size accompanying fertilization but this will never double the yield. Again fertilization may increase the set to such a point that the apples if left to maturity are smaller. In such cases thinning is the recommended practice to enhance the size and color of the fruit.

2. By increasing the percentage of "set," so that though the number of blossoms is not increased the number of apples are. The effect of fertilizers, particularly nitrogen, on set is very marked, especially on distinctly weak trees. An increase from 5.3 barrels on unfertilized to 14.39 barrels on fertilized trees over a period of 18 years has been recorded. To secure such benefit the fertilizer should be applied at the rate of from 2 to 4 pounds of a quickly available nitrogenous fertilizer per tree that is of good bearing age, 10 to 14 days before the trees are in full blossom. Applications of fertilizers on the "off year" to affect a set are of questionable use; applying fertilizers to increase the set is a temporary stimulation only. More trees will show evidence of response to this method of

fertilization than in any of the other three, but unless this method of stimulating the tree and thereby increasing the set is augmented by some other fertilizer application to build up a bigger and better tree, it will eventually fail to respond to even this method.

3. By increasing the frequency with which the various spurs on the tree form fruit buds. In the majority of our mature orchards no great benefit can be expected from increasing the frequency of fruit bud formation on the older spurs. Even in very weak orchards the trees continue to blossom in alternate years and even after several years of fertilizing, their performance remains the same. It is difficult to change the fruiting habits of varieties such as Wagner and Baldwin which are almost persistently biennial croppers.

4. By making a bigger and better tree with more spurs on which blossoms can be borne:

(a) As the trees grow older, even in good soil they tend to make less terminal growth.

(b) The less terminal growth made this year, the less room there will be next year for formation of new spurs to bear the following year and to replace the wastage of the older spurs.

(c) Without this new growth and new spur formation the tree may continue fruitful for a while but will hardly hold its own in yield and will go down sooner or later.

(d) The effects of fertilization are evident more often in stimulating this new terminal and new spur growth than they are in stimulating the old spurs.

(e) This effect cannot be translated into fruit for at least three years, but once the additional frame work is established it is a permanent ground while the effect in set is but temporary.

How Measure Fertilization Effect

Therefore, from this we learn two lessons in orchard fertilization. In considering the advisability of orchard fertilization or in measuring its effect watch: first, the set of the blossoms, and second, the formation of new fruiting wood. If these are both satisfactory where no fertilizers have been used, the money set aside for fertilizers can be invested elsewhere to better advantage.

If the shoot or terminal growth in your mature orchard is long enough so that each terminal of last year's growth forms two to six new fruit spurs, the grower can feel rather satisfied. The chances are very strong in trees of this kind that the old spurs are doing all that can be expected of them. If they are not, attention to pruning rather than to more fertilization is necessary. If new spurs are not appearing you can use your money on fertilizers in hope of getting good returns. Fertilization for wood growth is as good one year as another.

Some orchards up to standard in other respects, i. e., growth, bud formation, and bloom, may still have the set profitably increased by application of a quickly available nitrogenous fertilizer. It is better to have some excess to be "thinned off" than to have a poorly distributed load. If they fall below this standard, fertilization in the blossoming year is advisable.

Age of Tree Must Be Considered

One other aspect of fertilization should be considered, age of tree. Many trees which now respond markedly to fertilization, showing need of it in three distinct ways, have in former years been productive without it. The age of the tree makes a great difference in its requirements.

Trees in sod are much more likely to repay and to require fertilizers. To no little extent nitrogen-carrying fertilizers act as substitutes for cultivation.

It is doubtful if they would serve as substitutes for cultivation in soils subject to drought.

In many orchards so situated as to dispense with cultivation for a few years at least, using fertilizers is a cheap substitute, and at the same time,

With the fertilization the same on all cultural plots, the largest average annual yield was obtained on the sod-strip plot.

in some measure, secures the high colored fruit, that characterizes sod-grown trees. Before ordering fertilizers look at the trees rather than the soil. Where fertilizers are needed, apply around the tree and out slightly beyond the tips of the branches.

Consider Plant Food Requirements

The successful orchardist must consider the food requirements of his trees as a stockman considers the rations for his stock. He must provide for growth and maintenance of the trees as well as provide, in addition to these, the fertilizer necessary for the annual production of fruit.

Nature may materially aid in this fertilization if the orchardist's efforts are directed in the right channels. The action of soil bacteria on the humus or unavailable forms of plant food, particularly the unavailable surplus of nitrogen, changes them to nitrates, the only form in which nitrogen can be taken up by the plant roots. Nitrification requires a warm and well-aerated soil, hence nitrification is not possible in very early spring when the ground is wet and cold.

Science has given us some general principles which may materially assist us in understanding and probably reducing our fertilizer bills.

Briefly, they are as follows:

(1) Correct balance between nitrogen,carbohydrates, and moisture to get vegetation and fruitfulness.

(2) Nitrogen and moisture without a balance of available carbohydrates results in unfruitfulness.

(3) Abundant nitrogen and available carbohydrates give increased vegetation and unfruitfulness.

(4) Lack of nitrates without available carbohydrates results in unfruitfulness.

That is, we must have available carbohydrates and moisture but not an over-abundant supply of nitrates if fruitfulness or vigor are to be obtained. And these must be in the right proportion, of 4-2-1, or 4 lbs. nitrogen, 2 lbs. phosphoric acid, 1 lb. potash. In short it is not so much the absolute amount of each fertilizing element present that counts as their proportion to each other.

The Importance of Moisture and Nitrogen

Nitrogen must be taken up by apple trees in the form of nitrates and always in a water solution. This shows the importance of moisture.

Nitrogen promotes development of stems, leaves, branches, etc., demanded largely during the active vegetation

period. Deficiency of nitrogen is shown by the following symptoms:

Pale green or yellow foliage.

Bright red colored foliage in dry weather denotes nitrogen starvation.

Bright red colored foliage in autumn denotes nitrogen starvation.

Light brown or reddish colored bark on two- or three-year wood denotes nitrogen starvation.

Weak growth of terminals denotes nitrogen starvation.

The average Annapolis Valley orchard soil analyzes .1 to .2 per cent nitrogen, which is low. Some may reach .5. Marsh soils may go over 1 per cent, while in some orchard soils in Colorado the nitrogen content is around 5 per cent.

Carbohydrates are complex substances consisting of starches, sugars, gums. These are made up of carbon, hydrogen, oxygen in varying proportions. Carbohydrates are manufactured by the leaves of the tree from the constituents nitrogen, phosphoric acid, and potash entering the roots in solution and from carbon dioxide taken in by the leaves from the air. Any excess of carbohydrates above what the tree needs for immediate consumption is stored in the form of starches in the portion of the tree close to the leaves which manufactured it. That is, the healthy tree has usually stored within its tissues a reserve supply of carbohydrates.

Nitrogen may be stored in limited quantities but the tree in the spring looks to the soil for further supply of this element. In our apple tree, then, we may have:

(1) A limited reserve of stored nitrogen,

(2) Possibly a good reserve of stored available carbohydrates, and

(3) Usually a sufficient supply of soil moisture. And as we have pointed out, as nitrification of the unavailable supply of nitrogen is slow in the early spring, we should endeavor to balance our carbohydrates and moisture by a little more quickly available nitrogen at this time, not only to aid in fruitfulness but to supply nitrogen for the rapid development of the leaves so that they in turn may get to work on their annual function of making and storing carbohydrates.

Applications of nitrate after nitrification has commenced may upset balance and produce winter-killing.

The Role of Phosphoric Acid and Potash

Phosphoric acid, or P_2O_5, promotes root development, seed development, and fruit development. The average soil analysis is .15 or .25 per cent. Soils falling below .15 usually give a response to its application.

Potash (K_2O) is essential to fruit production in that it aids in the formation of carbohydrates, that is, starches, sugars, etc. Potash also aids in the production of proteins. Analysis of bearing or fruiting apple spurs show them to contain a considerable amount of potash, whereas non-bearing spurs show only a trace. Average soil analysis, .25 to .5 per cent. Soils falling below .15 per cent respond.

Lime is important in the process of nitrification in the soil and is essential in the production of leguminous cover crops, but with our tests with apples has not proved beneficial in increasing the apple crop.

Drainage Is Essential

It is quite possible that under certain conditions and proper soil management that one or two or all of these elements, nitrogen, phosphoric acid, and potash, may be supplied by nature from the soil and air to meet the full requirements of the fruitful apple tree, but unfortunately there is no accurate way at present by which this can be determined.

Solving the Problem

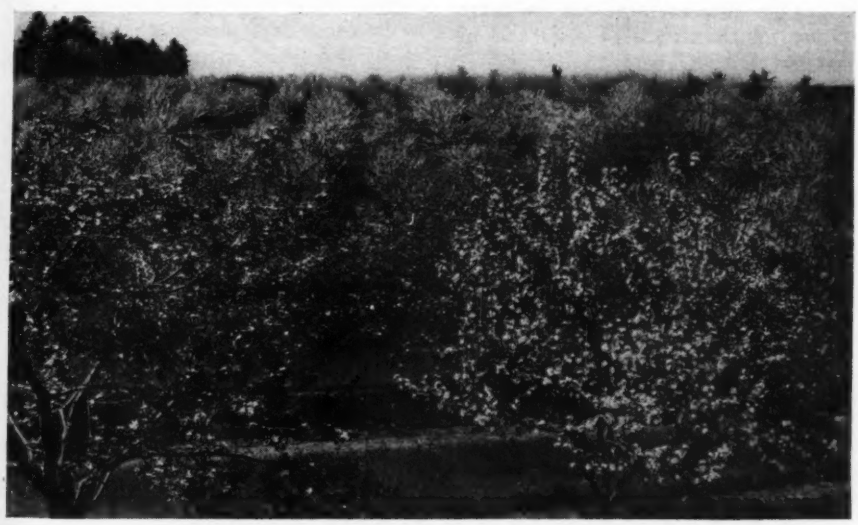
We have, at Kentville, made a determined effort to solve some of these problems as to the fertilizer requirements of apple trees, but find so wide a variation in production of individual

trees under same treatment due to some factors other than in the fertilizer supplies, that it is difficult to make many definite recommendations.

We have, in our orchard fertilizer experiments started in 1912, variations in yields from plots receiving the same fertilizers that are very conflicting. For instance, with plots 1 and 16, each of the same varieties receiving the same fertilizers (150 lbs. nitrate of soda, 350 lbs. superphosphate, and 150 lbs. muriate of potash per acre) applied on the same day each year, and receiving the same cultural treatment each year, yet plot 1 has given a total yield since planting of 319.69 barrels, while plot 16 has yielded 777.06 barrels per acre. These plots are not 300 feet apart. I ask you what is the cause of the variation? The trees are thrifty and vigorous and apparently normal. But there are some factors affecting the yields of these trees that we are unable to explain. We think it due most likely to the variation in the type of rootstock upon which these trees are propagated.

Again, in our limed plots where ground limestone has been applied at the rate of two tons per acre, five applications being given since 1916, usually one application each three years, the limed trees show a slightly greater tree diameter, but the unlimed plots have outyielded the limed plots by 0.19 barrel per tree over a period of 18 years. In this orchard, .19 barrel for 54 trees per acre equals 10.26 barrels more apples per acre, which at $2 per barrel tree run equals $20.54. The 10 tons of limestone at $4 would amount to $40 and the cost of applying it at $2 per ton would make an additional $20, making a total of $60 expended, for which we received $20.54 less apples in the total yields.

During the first 10 years of this orchard's growth there was practised a three-year rotation, potatoes, wheat, and clover hay, when the yields from the limed plots particularly of clover hay were much greater than those from the unlimed plots. This clover hay was harvested and removed as hay. Had it been left to be returned to the orchard soil as a green manure in building up and maintaining the humus content of the soil, the results might have been different, but the fact remains that the better growth of an aftermath and the better clover sod, both rich in nitrogen, were returned to the soil and in spite of this the apple yields on the limed plots were not augmented.



A view of the Experimental Farm Orchard at Kentville, Nova Scotia.

The series of tests on the source of nitrogen for apple tree growth and fertilizers was started in 1927 in an orchard set in 1912 and was conducted with the varieties Baldwin, King of Tompkins, with Wagner fillers. The trees are set 40 x 20 feet. Duplicate plots in both the Baldwin and King's blocks make quadruple plots of each test. All plots except the check received a blanket application of two pounds of superphosphate and one pound of muriate of potash per tree, The nitrogenous fertilizers were applied in proportion to the nitrogen content. All plots received exactly the same amount of nitrogen per tree. These fertilizers were applied, regardless of their composition, about mid-May. The results to date covering four years are given in Table I.

Table I—Source of Nitrogen for Apple Tree Growth and Fertilizers

Treatment	Total yield four years per tree (bbl.)	(bbl.) per acre	Cost of fertilizer
Nitrate of soda 5 lbs.	6.595	356.13	38.32
Nitrate of lime 5 lbs.	6.50	351.	37.92
Cyanamid 3½ lbs.....	5.87	317.25	29.52
Sulphate of ammonia 3¾ lbs.	5.36	289.44	29.78
Check	5.23	282.82	....
Superphosphate 2 lbs. } Muriate of potash 1 lb. }	4.86	262.44	8.10

In the study of these results, which are not conclusive, the indications are that the nitrogenous fertilizers that are in the nitrate form are the better to use. Both nitrate of soda and nitrate of lime have given in this test better results than the other nitrogenous fertilizers. Had the cyanamid and sulphate of ammonia been applied at an earlier date so that the nitrogenous compounds would have had a chance to disintegrate prior to the bloom period, the results might have been different. However, other investigators have reported that they have found nitrate of soda, sulphate of ammonia, and cyanamid in the order named effective in increasing the total nitrogen content of fruit spurs on trees that are fertilized annually.

Potash Increases Apple Yields

From Table II it will be observed that potash has been a factor in increasing the yields of apples harvested, and these increased yields, with one exception which can be accounted for by a favored soil condition, have been in direct proportion to the amount of potash applied.

Previous to the World War potash was one of our standard orchard fertilizers, but during the years of strife with Germany, who is the world's chief exporter of this material, our supplies were cut off and we did without potash in our apple orchards without any apparently very harmful results. This was probably due to our method of orchard fertilization for some years prior to the World War.

In those days some orchardists were using barnyard manure, others com-

(*Turn to page* 58)

TABLE II—EFFECTS OF POTASH ON APPLE TREE YIELDS. VARIETIES: GRAVENSTEIN AND WAGNER. TREES SET IN 1912.

Plot.	How Fertilized, pounds per acre	Av. yield per tree since planting: Graven-stein	Wag-ner	Average yield per tree, two varieties	Yield per acre since planting: Total	Annual	Total cost of fertilizer	Value of apples, $2.00 tree run	Value of apples less cost of fertilizing
		bbls.	bbls.	bbls.	bbls.	bbls.	$	$	$
16	N*, 150; P*, 350; K*, 150...	16.44	12.34	14.39	867.06	48.17	174.40	1734.12	1559.72
5	N*, 150; P*, 350; K*, 100 ..	12.86	9.18	11.02	595.08	33.06	158.70	1190.16	1031.46
9	N*, 150; P*, 350; K*, 60...	11.43	8.00	9.61	518.94	28.83	146.14	1037.88	891.74
13	N*, 150; P*, 350; K*, 30...	10.97	5.00	7.88	431.46	23.97	136.42	862.92	726.50
24†	N*, 150; P*, 350; K*, 0...	14.29	5.02	9.66	521.46	28.97	127.30	1042.92	915.62
15	K*, 150	10.38	5.00	7.24	400.96	22.28	47.10	801.92	754.82
14	Check	5.77	4.83	5.30	286.20	15.90	.....	372.40	372.40

† This plot has a favored soil condition.
* N—nitrate of soda
* P—superphosphate.
K—muriate of potash.

Taking Time Out *for* Recreation

By Jerome J. Henry

National Broadcasting Company, Inc., Chicago, Illinois

CALVIN COOLIDGE advised us to take a vacation this summer, and suggested the action as an aid to brushing the cobwebs off prosperity.

Maybe he's right. The truth is there may be a good many ways a vacation might be used and remembered as more than an idle holiday.

Particularly fortunate, for instance, are those of us who love the soil and have a chance to vacation among the trees and wild life good old Mother Nature supports. Along about this time of the year agricultural teachers, county agents, and "cow college" faculty members often think more of the fish pole than they do about liming campaigns and test tubes.

But either is a worthy adventure, and what better time is there for constructive thinking than early morning along a cool trout stream?

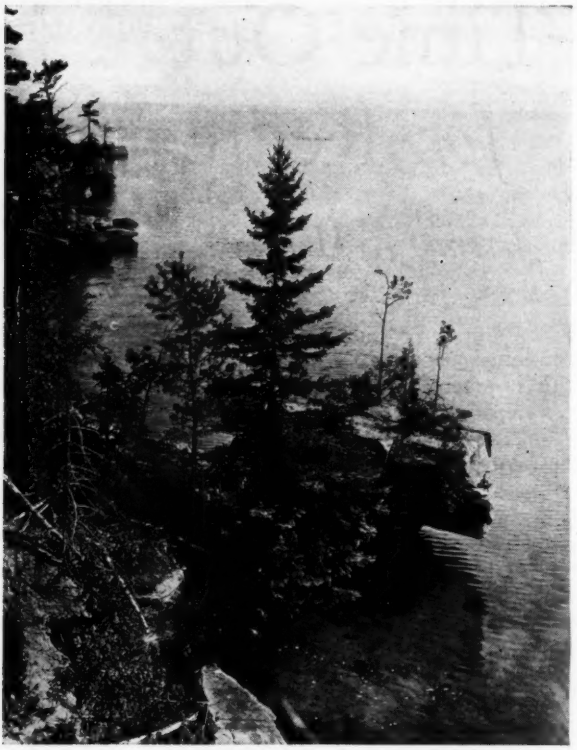
A vacation in the woods, a drive through some farming section, or camping along a favorite fishing stream or lake gives one a fine chance to view, and estimate, the value of our resources, and also reflect upon the damage already done by short-sighted interests.

Did you ever view a hillside half washed away; or perhaps a field where heavy rainfall has taken a fresh alfalfa seeding down into a ravine? These are examples of destruction which might have been averted if trees had been left standing on some of the less productive soil only fit to raise trees.

And it is the agricultural leader who can best use his ideas toward improving the existing conditions. To him a well-planned jaunt may result not only in refreshment but also in ideas that are really constructive.

Few people in this day and age disbelieve the theory that farmers should enjoy an annual vacation. They too may spend it in the great out-of-doors, probably accompanied by the county agent, Smith Hughes teacher, or extension worker. What better opportunity is there for one to learn to understand the other? And what better chance for both to look into

The Great Outdoors—Forever Inviting.



Photo—Courtesy, Wisconsin Conservation Commission.
Scenes to remember! Overhanging rocks clinging in their positions—resisting for years and years the slow but never-ending wear of the waters.

existing conditions of forests, streams, wild life, and other resources.

Let's suppose a group of farm families together with some agricultural leaders are enjoying a fishing trip near some favored spot in the North woods. When darkness falls and even the music of birds ceases except for the occasional owl or whip-o'-will, a huge campfire stimulates conversation that probably would never otherwise be revealed.

Such a setting is indeed fitting for thoughts and words having to do with the conservation of the splendid resources of trees and game, and also probably, at the same time, helping to make the farming industry more profitable.

Efficiency in farming often means getting the most out of every good acre. Can this be possible so long as everyone is interested in the number of acres available for agriculture rather than the use of good land properly fertilized?

Proper fertilization of land for forests, then, is closely related to the use of land for agriculture. Furthermore, it may result in greater efficiency and protection from one of the most devastating factors in American farming, soil erosion.

It is estimated that only about 40 per cent of the original forests in the United States remain, and that the existing timber is being used at a rate four times as great as unaided nature can restore it. Forest fires also contribute immensely to the destruction. Like a red demon eating everything in its path, fire spreads havoc not only to trees but also to game and streams.

But that's not all. Another silent destroyer of our resources, and one which is more quickly felt, soil erosion, is aided every time trees are cut down. Washing fertility from tens of thousands of acres down into the Gulf of Mexico each year, soil erosion damages close to three quarters of the farms in the United States. In terms of dollars the resultant loss divided equally among all the farmers in the country amounts to a very appreciable figure.

Reforestation is one of the most effective ways of curbing this difficulty. Coupled with systematic cropping and pasturing, this method would relieve a great percentage of the loss.

Driving through many farming sections the losses due to erosion can be easily seen. And the remedy is in-

deed a pleasant one, we agree, while we're sitting around the campfire recounting stories of Paul Bunyan and the winter of the blue snow, or perhaps, having some difficulty with getting the trout cooked on more than one side before the fire burns low. Reforestation, then, is not only a way to profits but also to pleasure and stability.

Yet there are those who say that trees are not a profitable crop, and they present the argument that, if they were, commercial lumber companies would grow them on a large scale. How unreasonable is this contention when one stops to think that much of the 200-million-dollar annual loss due to erosion might be stopped by reforestation and, in addition, the trees would in time give returns not to be slighted. Too, some lumber concerns have undertaken reforestation projects and have seen fit to treat the crop with as much care as science dictates should be given wheat, corn, and livestock. Even to the point of fertilizing nursery soils with commercial plant foods has this undertaking gone.

Let us imagine, if possible, that the greatest percentage of soil erosion on our farms is under control. According to the beliefs of many foresters, extension specialists, and other agricultural leaders, farming practices could be greatly improved were it not for this robber of plant foods.

Commercial applications of nitrogen, phosphoric acid, and potash could be made with much less precaution and greater profit since, without erosion dangers, much of it could be depended upon to enter the tiny root hairs of the farm-crop plants.

Soluble mixtures of commercial fertilizers might be applied in larger amounts with better assurance of highest possible returns, say soil specialists.

Unlike taking medicine, the remedy for soil erosion is indeed pleasant. Love of the outdoors and character

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Photo—Courtesy, Wisconsin Conservation Commission.

A paradise for the angler is this walled-in spot on the St. Croix river in northwestern Wisconsin.

Getting Ready *for the* Fair

By E. N. Bressman

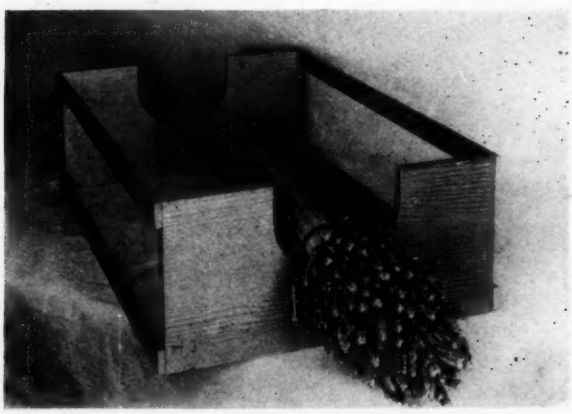
Associate Professor of Farm Crops, Oregon Agricultural College

GROWERS who exhibit their products at the various county, State, and local fairs are among our very best farmers. They are interested not only in going to the fair but also in taking an active part by having some of their best products judged. More than a decade of experience has taught me that these observations are true, and in addition I have been able to obtain many pointers in regard to the showing of crop products. I have judged products of all kinds at more than 100 different fairs, and the experience has shown me that many exhibitors have failed to observe some minor detail and have, therefore, lost both a ribbon and a premium.

Growers who have a county agent in their county are fortunate, for they are able to consult their agent in regard to the details of showing products. If there is no agent present, the grower should get a premium list from the fair and study it thoroughly. Many awards do not receive prizes because they do not conform to the rules of entry. Help may also be obtained from the agricultural colleges. For example, the Extension Service of the Alabama Polytechnic Institute at Auburn, Alabama, has a very interesting circular with the title, "Fairs." Growers, particularly those in the South, may get much of their information from this bulletin. It contains not only information on field crops, but such a varied assortment as vegetables, fruits, nuts, meats, lard, foods, clothing, art work and livestock.

Most fairs request a certain size of exhibit. If they do not the usual exhibit includes three specimens of the larger vegetable crops, such as pumpkins, cabbages, and melons. The smaller vegetables such as onions, parsnips, carrots, and sweet corn are made up of six specimens.

Fruit is usually exhibited as plate samples. These plate samples usually consist of five specimens for such things as apples and peaches. Smaller fruits require 10 specimens.



A mold facilitates the work of making a grain sheaf.

This refers to things such as prunes and nuts. Berries are often exhibited in pint boxes or a pint specimen is put out on a plate.

As a rule most fairs require a 10-ear corn exhibit and the small grain specimens usually consist of one peck. The requirements on sheath samples differ greatly, but as a rule fairs of any size require three sheaves. This matter of size or number of specimens to include in an exhibit is of importance and is one that is too often overlooked by the grower.

These are good forage sheaves—alsike clover, red clover, Kentucky bluegrass, and redtop.

If the exhibit conforms to the requirements of the fair, then it is judged from many different standpoints. Some of the factors which are applied to nearly all exhibits are shape, size, condition, uniformity, and quality. One of the most important requirements is condition. If an exhibit is not in good condition and free from disease, it has little chance of receiving an award. Some of the common faults of exhibits are mechanical injury to potatoes, scab of potatoes and apples, smut of the grains, mold on corn, and insect blemishes on the various vegetables.

Quality Counts

Size is very often over-done in most exhibits. It is not size that counts, but quality. Many times the large, over-grown exhibits are extremely poor in quality and are not considered for premiums. Exhibits should be of medium size and typical of what is grown in the community. More emphasis should be placed on quality and condition than large size. It is true that small, under-sized exhibits are not typical of a locality and should not be entered.

In all of my experiences of judging, I find that the most common defect is lack of uniformity of specimens. Take corn, for example. When a 10-ear sample is required, the judge hopes to find 10 ears of corn as nearly alike as possible. This indicates to him that the grower has a large quantity of this type of seed. Many growers will pick 10 good ears without consideration for the uniformity. Individually each of the ears may be excellent, but collectively they vary greatly in size, shape, breadth, indentation, color, and type. If three pumpkins are exhibited they should be as nearly alike in general type, size, and shape as possible. This applies to all exhibits, and it appears that it is one of the hardest factors for the grower to get right.

Threshed grain should be pure for the variety and free from all objectionable foreign material such as weed seeds and dirt. Small seeds such as clover and alfalfa should by all means be free of noxious weeds, such as dodder, Canada thistle, and quack grass. Clean, bright samples go a long way in indicating to the judge the samples of seed are of good germination ability and are of this season's crop. Practically all exhibits require that the specimens be produced during the cur-

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The Inquiring Mind *and the* Seeing Eye

By Dr. A. S. Alexander

University of Wisconsin

NEW YORK CITY and State owe much to the able and enterprising men who emigrated from Holland.

Ever since September 3, 1609, when Henry Hudson, in the employ of the Dutch India Company, sailed into New York Bay, in the *Half Moon*, and the founding of the Netherland Company by merchants of Amsterdam, various "Vans" have been prominent in the business and political affairs of the New Amsterdam they established in 1626 and which, later, became New York City.

Van Rensselaer, Van Twiller, Van Dam, and Van Buren were famous names among the Dutch celebrities of those early days. Later, the name of Vanderbilt became noted, and today one finds many a "Van" rendering eminent service in our universities and agricultural colleges and experiment stations. Of these we have chosen Dr. Lucius Lincoln Van Slyke, agricultural chemist of the New York State Agricultural Experiment Station, Geneva, N. Y., as the subject of this month's biographical sketch.

Turned to Chemistry Early

That eminent scientist was born at Centerville, Alleghany county, N. Y., January 6, 1859. He is descended from a Holland family which has been in America for 250 years and associated with agricultural pursuits for several successive generations. His great grandfather was a soldier in the War of the Revolution.

After spending his boyhood days in Pike, Wyoming county, N. Y., and preparing for college in Pike Seminary, the great chemist-to-be studied in Michigan University, where he was given his A.B. degree in 1879, and then taught for a year in Pike Seminary. Returning to Michigan University, he majored in agricultural chemistry, gained the A.M. degree in 1881, and in 1882 was made Doctor of Philosophy.

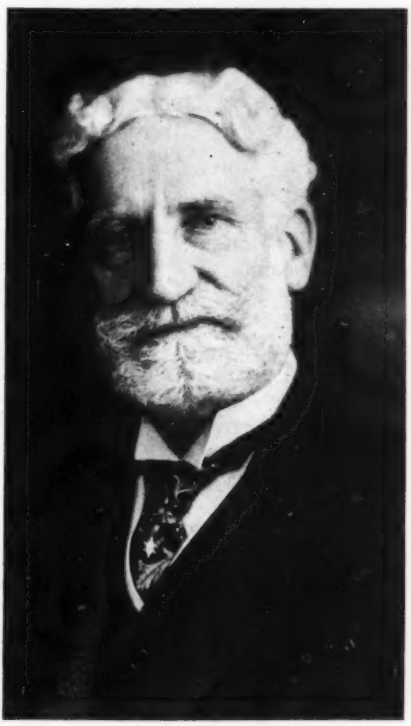
Opportunity Came in 1890

The experience he then gained was wide, unique, and a valuable preparation for what was to be his life's work. After acting as an instructor in chemistry at Michigan University, from 1882 to 1885, he served as professor of chemistry and Government chemist in Oahu College, Honolulu, from 1885 to 1888; then he returned to Michigan University, and for one year was a lecturer in agricultural chemistry. In 1890, came the real opportunity of his life, when he was appointed chemist of the New York Agricultural Experiment Station, N. Y., where he served with distinction until 1929.

Under the affiliation arrangement between the Geneva station and the State College of Agriculture, he was likewise professor of dairy chemistry at Cornell University, Ithaca, N. Y., from 1920 to 1923, and under the new administrative merger of the two institutions, a member of the graduate

school faculty of the University. During the year preceding the appointment of Dr. H. H. Jordan as the Director of the New York Agricultural Experiment Station 1895-6), Dr. Van Slyke served as acting Director, and inaugurated many systems for clarifying and regulating the business procedures.

Dr. Van Slyke's work at the New York Experiment Station has included several different lines, in addition to the investigation of dairy problems. He has had charge of the inspection analysis laboratories of the State ever since their establishment. The food analysis laboratories are elsewhere, but all analyses inspections, connected with the operation and enforcement of the State feeding stuffs, fertilizer, insecticide, and fungicide laws, are made at the Geneva experiment station. Dr. Van Slyke has had a large part in forming and interpreting these laws, and has been continuously in charge of the analytical service necessary to their enforcement. A large part of their success has been due to his painstaking and intelligent management of this part of the State's activities.



DR. LUCIUS LINCOLN VAN SLYKE

He has also been an active member of the Association of Official Agricultural Chemists, has served often as one of its referees, and once as its president. He is a Fellow of the American Association for the Advancement of Agricultural Science, and was president of the New York State Dairymans' Association, in 1897.

His son, Dr. Donald Dexter Van Slyke is one of the leading biochemists of the present era.

From an appreciation written by Dr. R. W. Thatcher, at that time Director of the New York Experiment Station, and now president of the Massachusetts Agricultural College, published in *Industrial and Engineering Chemistry* of November 1925, we learn that all of Dr. Van Slyke's work in this country has been in research; therefore he does not have a host of former students to remember his personal touch in their lives; but his many contributions to the literature of agricultural chemistry have made him known professionally to multitudes of scientist readers. His publications include 54 station bulletins of 1,926 pages on dairy research; 5 bulletins of 132 pages on the preparation and chemistry of spraying materials; 2 bulletins of 28 pages on experiments with fertilizers for potatoes; 2 bulletins of 58 pages on experiments in testing sugar beets; 1 bulletin of 55 pages on the chemistry of home-made vinegar; 63 bulletins of 2,858 pages on inspection of fertilizers, feeds, and insecticides, and 3 circulars of 27 pages; or a total of 130 publications, of 5,084 pages.

He has also contributed many instructive articles to scientific journals and published several standard textbooks, including *Modern Methods of Testing Milk and Milk Products,*" *"The Science and Practice of Cheese Making"* (with C. A. Publow), *"Fertilizers and Crops," "Cheese"* (with Price), and a contribution to Allen's *"Commercial Organic Chemistry."*

Special Interest in Fertilizers

It would seem from his publications that Dr. Van Slyke has taken special interest and pleasure in his work relative to fertilizers and crops. His conclusions regarding the various phases of those subjects show deep insight, and practical knowledge of their utilitarian importance. After his long years of research work in this connection, and granting that our knowledge of the functions and proper use of fertilizers has been largely increased during the past generation, as the result of experimental investigation, and that even more rapid advances are now being made, he has frankly confessed that there is yet no simple way of determining, beyond doubt, when and how best to use fertilizers in crop growing. He considers the conditions involved so complex that they do not usually permit any reliable short-cut method of reaching satisfactory conclusions. In seeking to arrive at them, one must carefully and exhaustively consider the conditions under which fertilizers should be used, the specific constituents of plant food needed, the amount of each fertilizing constituent needed, the forms in which it is best to supply plant-food constituents, the facts about commercial fertilizers and home-made fertilizers, methods and seasons of applying fertilizers, and crop rotation in relation to the use of fertilizers and plant-food mixtures for different crops. These, and related subjects, are interestingly and instructively discussed in his book *Fertilizers and Crops.*

From what Dr. Van Slyke has written, it is evident that scientists have as yet touched only the rim of the crop growth and fertilizing problem; therefore, the rising generation of research men need not worry that the "old fellows" have left little for them to do. The scope for research remains illimitable.

Dr. Van Slyke believes that the present appears to be preeminently a time of flux and transition. Especially is this true in regard to the theories of soil fertility and soil infertility. He says that a theory is simply a proposed explanation of an observed fact or set of facts, and that theories usually change with the accumulation of new facts. Let the younger generation seek for these facts.

He is of the opinion that farmers who purchase fertilizers blindly, on the sole basis of the hope of obtaining larger crops and greater net income, inevitably run the risk of throwing away money by buying what may not give good commercial returns, due either to applying constituents not needed, or to the application of needed materials under conditions so abnormal as not to permit of proper utilization. Much work remains to be done that the farmer may be confidently and correctly guided in making his purchases of fertilizers and in the intelligent application of them to his land.

Fertilizers Are Not Mere Stimulants

It is well known that commercial fertilizers, whether complete or in the form of unmixed materials, are often regarded as stimulants, injuring the physical qualities of the soil, as well as leading to more rapid exhaustion of plant food. Relative to this subject, Dr. Van Slyke has said that commercial fertilizing materials are not mere stimulants, but contain genuine plant-food constituents which will promptly manifest their beneficial action, when given a fair chance.

His conception of a real soil stim-

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Mr. Masino's son showing one of his customers a quality green specimen. The four acres of cucumbers can be seen in the background.

Quality Cucumbers

By L. J. McDonald

Agricultural Agent, Chamber of Commerce, Henryetta, Oklahoma

IT has taken Delfino Masino several years to learn how to grow a quality green cucumber, but at last he has mastered the art to his entire satisfaction. He says, "4-8-10 fertilizer and good seed tell the story."

Mr. Masino, at one time mined coal in the Henryetta fields, but when coal consumption declined and work was scarce, he turned to other activities to provide a livelihood. He purchased a small tract of bottom and semi-bottom land and started growing truck. A pond was built and irrigation practiced to some extent. Yet his yields were not satisfactory. Finally he was induced to try commercial fertilizer, and after three years experimenting has concluded that 4-8-10 puts the quality in all of his products. The fame of "Masino-grown" products has extended many miles and has built a ready market. His two-ton truck makes regular trips to Tulsa and to the Kansas City markets.

Mr. Masino depends upon a large variety of seasonal crops to supply his trade, but realizes most profit from his mid-season plantings. Tomatoes, squashes, cucumbers, okra, egg plants, sweet peppers, and cantaloupes are his best money makers. This year, when the season was only half over, he had already harvested more than 400 bushels of cucumbers from four acres. It is a common thing for the cucumbers in one of his baskets to average 10 to 12 inches in length and quality from one end to the other. He often uses as much as 500 lbs. of 4-8-10 and always secures a good yield.

"Pure seed, a high-analysis complete fertilizer, and frequent cultivation are necessary for quality vegetable production," according to Mr. Masino.

Why Raise Food *for* Bugs?

By C. H. Brannon

Extension Entomologist, North Carolina State College

FEW people realize the enormous tax collected by insect pests. We hear a great deal of talk about taxes these days, but American people demand a certain standard of living and it is difficult to reduce taxes; on the other hand taxes must be continually increased to meet the demand of higher standards of living. Insect pests collect a tax of well over $2,000,000,000 each year in the United States. This tax is used for no good purpose; it builds neither good roads, schools, nor parks. This tax money is absolutely destroyed at the expense of the American people.

These Taxes Can Be Reduced

Something can be done about the $2,000,000,000 tax collected by insect pests. We are asleep at the switch. If we continue, tragedy may be the result. It is the purpose of this article to arouse American agricultural interests to consider insect pest control more seriously; to include insect control as a regular part of the crop system. We are in the habit of taking a chance; of humbly accepting what the bugs leave. Can we construct sound farming on such a basis? We talk of relief. Who can help us until we make an intelligent effort to help ourselves?

The cotton boll-weevil causes an average yearly loss of $300,000,000 to the South and to the nation. This tax, like all others, is passed on to the consumer. How slowly the cotton States have taken action to meet this problem!

We boast of living in a scientific age, we speak scornfully of primitive peoples and of the narrowness of the middle ages, but today insect pests are causing more damage on the face of the earth than ever before in the history of the world. Why is this true? Medical science has suppressed most dread diseases such as smallpox, yellow fever, rabies, tetanus, etc. Many diseases have been practically eradicated. The great cancer problem is believed to be nearing at least partial solution. Human disease is decreasing—insects pest damage is increasing! In spite of the thousands of dollars expended yearly on investigation, the problems continue to increase. Why?

We grow certain crops in certain areas best suited for their growth. This is the only wise system. There are certain areas best suited for peaches, apples, cotton, wheat, tobacco, etc. But this favors insect damage, too. Pests preferring the product grown find plenty of food close at hand and can increase at an enormous rate. In early times this was not true; vast areas often separated one farm from another; pests spread with difficulty.

Are Unwelcome Immigrants

A great many of our major pests have gained entrance from foreign countries, to wit: boll-weevil, Mediterranean fruit-fly, Japanese beetle, Mexican bean beetle, Hessian fly, European corn borer, gypsy and brown tail moths, pink boll-worms. These pests are no longer attacked by many natural enemies which kept them under control in their native homes. If they can adjust themselves to our climate, they find themselves in a paradise and

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Chinese Jujubes Are Good

By U. V. Wilcox

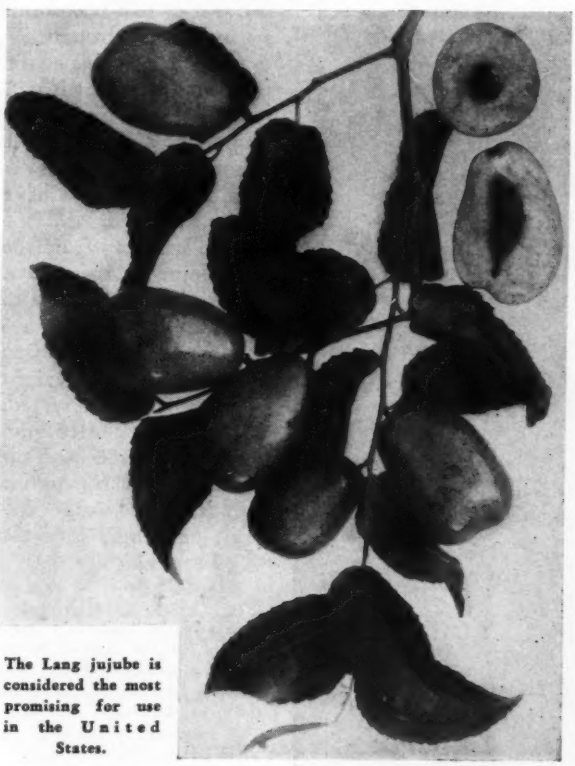
Washington, D. C.

"HAVE some jujubes," says Uncle Sam, "you'll like them, they're good."

As evidence of the fact that he knows what he is talking about there is the testimonial of connoisseurs of the Far East who have enjoyed their jujubes for thousands of years. These are not the tiny, skin and pit variety sometimes found growing upon the ornamental jujube tree, but large, delicious fruits, fragrant, tasty, and easily grown.

A Chinese living more than 300 years ago, Li Shi Chen, told of 43 varieties of jujubes known in his country, and an explorer of ancient writings, De Candolle, says that the Greeks and Romans became acquainted with the jujube, perhaps, 2,500 or 3,000 years ago after it had been carried about in the commerce of Asia for long generations. Europe has its jujube trees but most of them are small and the fruit likewise small.

The alert Chinese apparently took the small variety of jujube and through a process of selection developed a large, delicious-tasting fruit. It is this variety that is so well adapted to many regions of America. The jujube, it seems, will grow in semi-alkali soils, in dry soils, and because it flowers so late, it is rarely injured by spring frosts. Furthermore, it is a certain bearer having learned somehow, throughout the ages, to have no off years.



The Lang jujube is considered the most promising for use in the United States.

The peculiar habit of the jujube of shedding its young branches gives the tree an open appearance which, with the rather short curved woody branches and gray bark, makes the tree distinctly ornamental, even during the winter months. So says C. C. Thomas of the Office of Foreign Seed and Plant Introduction. Mr. Thomas sees a place

particularly in the south-western parts of the United States and in the regions where the weather is not too cold, for the use of the hardy jujube not only as a source of a delicious fruit but in ornamental plantings, for hedges, and for property line plants.

Some varieties of jujube have long been grown in America. The trees are found in California, Texas, Florida, Georgia, and intermediate States. No one has complained of their hardiness or their inability to survive, in fact even in the more northern States they will grow well.

Jujube fruit appears in various colors thus fitting into the color-conscious schemes of modern life. Jujubes first appear reddish with brown spots on green. As the size increases the spots merge and then the fruit turns to a dark chestnut brown. In the Mu Shing Hong variety the fruit is beautifully mottled. Eventually the fruit becomes wrinkled and dries out into a reddish brown.

The fleshy portion of the jujube fruit is drier than that of our common fruits. The Li variety is more crisp and not so dry. In the Southwest, the jujube ripens in August while in other parts it waits until the early part of September. The hardiness of the tree is shown in the fact that while only a year old it may begin bearing, and in the second and third year may yield abundantly.

Speaking horticulturally, Mr. Thomas says that "the jujube grows vigorously in hot climates and reaches its best development where the weather is dry, the sunshine brilliant, the nights warm, and the summer long and hot. The southwestern section of the United States, where such weather prevails, is especially well adapted to jujube culture. The trees do well in Texas without irrigation and they also do well in California with irrigation. After the trees have become well established they can withstand a considerable drought."

Another valuable credit to the plant is that it will resist insect pests. In the long years under which it has been under observation, no insect pests have been discovered.

And speaking from the standpoint of the palate, the jujube adapts itself to many and numerous appetites. It can be eaten as any other fruit, right off the trees, preserved, or made into confections. Chefs who have used the jujube list it for use in breads, cakes, cake fillings, puddings, as mince

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As a rule the jujube is a heavy bearer, and the contrast of the smooth, dark-brown fruits with the glossy, green foliage makes the tree decidedly ornamental. This specimen is 12 years old and about 20 feet high.

There is a prosperous look about the buildings on the Helgeland stock farm.

"It Makes Me Money"

Commercial Fertilizers Pay Profits on This Stock Farm

By Van M. Storm

County Agent, Blue Earth, Minnesota

TEDDY HELGELAND, of Bricelyn, Minnesota, a beef cattle feeder and a dairyman operating a rich, black land farm, has found that it pays to use commercial fertilizer in his system of farming for net profits.

Mr. Helgeland farms 160 acres. He is a stock farmer in every sense of the word, for at the present time he has two carloads of beef cattle on full feed, in addition to his regular herd of 12 grade dairy cows. He has 12 young cattle and 100 head of hogs on his farm.

He raises red clover and alfalfa for his hay crops, and plants 20 acres of sweet clover each spring which he uses as pasture for one year and plows up the following spring for corn. He has a large silo and threshes his small grain in the barn lot each year.

This is the system of farming which Mr. Helgeland has followed for a number of years, and when asked why he used commercial fertilizer in addition to all the benefit he gets from his legume crops and the large quantities of manure he gets from his livestock, his reply was:

"IT MAKES ME MONEY. When-

ever I can invest a couple of dollars in phosphate and potash and get back a net return of $8 or $10 I am going to do it."

When asked what induced him to start using commercial fertilizer, Mr. Helgeland told the following story:

"Two years ago the County Agent was advising the use of fertilizers and asked me to try some. One day while in town I bought a sack. I do not know now what kind it was, and after I got home I didn't know what to do with it. I had no machine with which to spread it on my land, so I scattered it by hand on one corner of a field of oats in which I seeded sweet clover. I didn't pay much attention to it and couldn't see much difference in the oats, for the shocks looked about even all over the field. That fall though I did see a big difference in the sweet clover. It was about twice as thick and grew much higher where I had put the fertilizer than in any other part of the field.

Sees More Difference in Spring

"The following spring, which was last spring, when the sweet clover came up, the corner I had fertilized seemed to come on earlier, it grew faster and was much thicker than in the rest of the field. Then again, later on, when I turned the cows into pasture it, they ate that corner off first and kept it short all summer.

"The way that little corner went ahead of the rest of the field, early in the spring, opened my eyes, so I decided to try some fertilizer on my sweet corn, and that is where I was able to figure my net profit.

"I asked the manager of the canning factory what kind of fertilizer I should use. As soon as I told him I was using clovers and lots of manure in my rotation of crops, he recommended that I use an 0-20-10 mixture.

"I had contracted to plant five acres of sweet corn, so I took enough 0-20-10 for 2½ acres or just one-half of my sweet corn patch. I measured the field carefully and used the fertilizer on only half of it. The whole field had the same care and treatment throughout the growing season.

"The field man for the canning company watched my field closely when it came near time to gather the corn. One day he told me to start hauling the fertilized corn to the factory and it was at this stage of the game I found out that commercial fertilizer was a real plant food and not a stimulant. My fertilized corn had matured nearly a week earlier than the unfertilized part of the field. I kept my weights separate, and when the last load of the whole five acres was taken to the factory, the manager figured out the yield for both parts of the field.

"The half I had fertilized averaged 3.05 tons per acre and the unfertilized part of the field only 1.77 tons per acre, a difference of 1.28 tons per acre in favor of the fertilized corn, or a net cash profit of $13.67 per acre after deducting the cost of the fertilizer. It was the best investment I ever made.

Neighbor Has Similar Experience

"My neighbor, Alfred Halverson, living northwest of Bricelyn, had about the same experience with a different kind of fertilizer. He planted 10 acres of sweet corn and used an 0-10-20 mixture on 3½ acres and nothing on the other 6½ acres. The 3½ acres, fertilized, averaged 3.23 tons per acre and the unfertilized 6½ acres averaged only 1.97 tons per acre. His net profit was $13.32 per acre by using the 0-10-20 mixture.

"We had a lot of fun at the factory while we were hauling our corn in. The factory chemist told us he could tell the difference in the corn that was fertilized and that which was not by making a chemical test. We would give him an ear of each kind and after he ran his test he would always tell

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Plant Food *and* Milk

By C. A. LeClair

St. Paul, Minnesota

WHEN farmers of Wisconsin, Minnesota, and Iowa saw butterfat prices slip down to less than "two-bits" a pound, they began doing just what good business men must do. They rapidly sought means of reducing their cost of producing milk.

Already through the work of cow-testing associations, few farmers were carrying unproductive individuals in their herds. Balanced feeding is nowhere in the world more of an art than it is on the farms of the North Central West.

What was there left for these wide-awake farmers to do? Thanks to the work of such missionaries as F. L. Musbach of Wisconsin, J. L. Boatman of Iowa, and F. J. Alway of Minnesota, the new trail was blazed. These men preached the sound economic gospel of how, by practising the same care in studying the production of every acre on the farm as had been employed in detecting boarder cows, cheaper feed and hence lower cost milk and meat was a possibility.

Musbach brought to the attention of the dairy industry the evidence of the tremendous loss of plant food from the land. Boatman pointed out how the yield and quality of corn were dependent upon the available fertility of the soil. To Alway and his associates is due the credit of working out the proper commercial fertilizer recommendations which have had much to do with the tonnage of alfalfa increasing in Minnesota from

Cows that produce 300 pounds of butterfat pay profits when fed generously fertilized crops.

less than 6,000 tons in 1910 to more than 1,000,000 tons at the present time.

Unless one glances back a few decades, it is difficult to realize how much the harvest of silage corn has added to the wealth of Northwest farmers. In 1900 silos were a curiosity. Today a farm without one is the exception. But what is more important, whereas once they were filled with a mixture of short, immature, earless stalks of corn and weeds garnered from a needlessly large acreage, today with the aid of commercial fertilizers they are filled with big, leafy silage corn with large ears of golden grain grown on a relatively small acreage. Fertilizer attachments for applying complete fertilizer in the hill or drill row at corn planting time now are considered as necessary as milk pails by pro-

Top-dressing alfalfa with commercial fertilizer made this difference. Four times the hay was produced on the left, following an application of plant food, as compared with the untreated part of the field at the right.

gressive dairymen.

Every farmer who has applied fertilizer in the hill or drill row knows what happens. R. M. Salter of the Ohio Agricultural Experiment Station, however, took the trouble to accurately measure the results of hill fertilization and he gave the world the facts so that anyone could follow the method and profit thereby. Salter found that if one is delayed for one reason or another in putting in his crop he can use fertilizer and get fully as good results as would be the case if the corn were planted three weeks sooner without fertilizing.

But supposing one plants his corn early and fertilizes it in an approved way, what can he expect? In the event of a late spring frost, the chances are better that the crop will escape injury than they would be if it hadn't been fertilized. The fertilizer applied makes that corn come into tassel at least a couple of weeks earlier than otherwise would be the case. If the season proves to be dry, the corn will yield far more bushels than if it had been starving for nourishment.

If anyone thinks that fertilizer has a tendency to make corn fire in years of drought, he is mistaken. Application of an unbalanced mixture might have such a tendency. On the other hand, I have never seen corn grown in a field on which a complete fertilizer, having a proper balance of all three elements, was applied which did not withstand dry weather better than corn grown on similar untreated land.

Again, in the fall if early frosts come as they often do after the fifth of September, the corn treated with commercial fertilizers has a ten to one better chance of escaping stalk and ear injury.

But what really counts is that the plant food applied in the hill or drill frequently makes a third larger crop of perhaps twice the feeding value as would be obtained without it. This provides one of the important ways in which dairymen are obtaining lower production costs and insuring their profits.

Rapidly, too, more attention is being given to the improvement of pastures. It is no longer believed that land in sod which is heavily grazed is resting. More commercial fertilizer was applied to pastures in Wisconsin in the spring of 1931 than had been applied since the beginning of time. Yet only a beginning has been made, for the value of fertilizer to extend the grazing season and improve the feeding value of grass is still realized by far too few farmers.

Boons to Dairy Industry

Maintaining clover and establishing more acres of alfalfa on every dairy farm are other boons to Northwest agriculture that the greater use of commercial fertilizer is accomplishing. To establish these rich feed crops

(*Turn to page* 53)

Asparagus Ferns

May Use as Much as 12 Tons of Fertilizer per Acre

By C. D. Wilder, Jr.

Gainesville, Florida

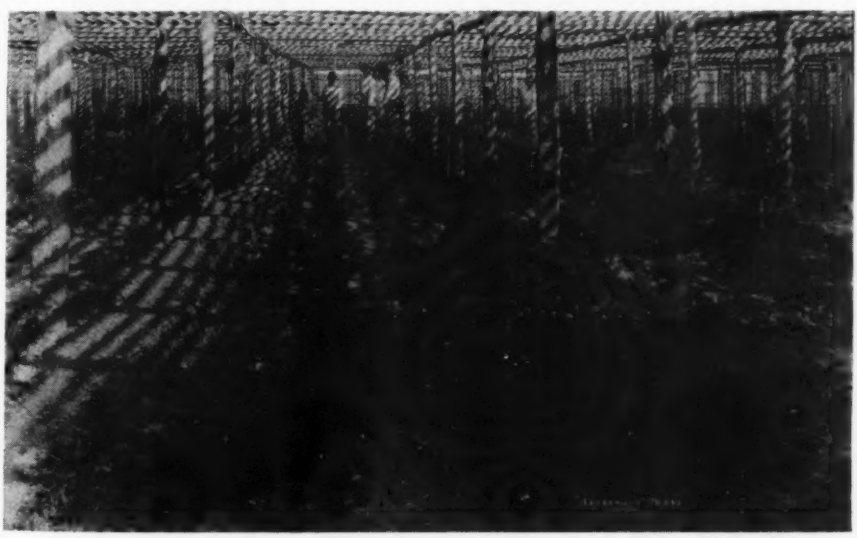
ONE of the most intensively grown crops of Florida is *Asparagus plumosus manus,* or the so-called "asparagus fern." Many growers apply 12 tons of fertilizer per acre in applications of a ton per acre per month for 12 months in the year. Few growers apply less than 9 tons per year. Approximately two-thirds of this tonnage is applied in the form of mixed fertilizer analyzing around 5-5-5.

The mixed fertilizer is supplemented with such materials as goat manure, tankage, fish scraps, ground tobacco stems, guano, and kainit. There is no general system of fertilizing; each grower follows his own ideas and applies fertilizer as he thinks his crop needs it.

Such heavy fertilization produces a tremendous yield. After a crop is cut over until there are no marketable fronds or sprays left, the crop is mowed off and a new crop is allowed to come on. This procedure continues year after year. The ferneries are never plowed and reset. It normally takes about 40,000 plants to set an acre 9 x 10 inches apart and leave rows to walk in.

The most difficult problem is to keep down long bare sprouts called "stringers," which are of no com-

(*Turn to page* 52)



This picture was taken in an old and well-established *Asparagus plumosus* fernery.

Intermediate Credit

By Edwy B. Reid

Washington, D. C.

FARMERS have long known that their need for credit is not the same as that of merchants, manufacturers or, in fact, any other group of individuals. Proof of this is found in the steady growth and use of the Intermediate Credit as supplied by the 12 Federal Intermediate Credit Banks through local lending institutions such as agricultural credit corporations, livestock loan companies, and commercial banks.

The farmer's turnover is slow, much slower than that of the ordinary commercial business, and his need for credit which will accommodate this slower turnover is great. This kind of credit frequently has been extended to him by country banks, but very many of them have decided that they would rather an agricultural credit corporation extend this sort of credit. In fact, many bankers have joined in the formation of such corporations in the last year or so. They reasoned that, by this action, they will keep their banks more liquid, that they can lend more for commercial purposes for short periods, and that they will be in a better position to meet the demands of their depositors whenever such a demand should arise. At the same time, the credit corporations, in many of which the bankers personally own stock, bring to their respective communities a new flow of money. As a matter of fact, these credit corporations, discounting farmers' notes with the Federal Intermediate Credit Bank, tend to reverse the flow of money from the country to the city, for the Intermediate Credit Bank obtains its funds to lend, aside from its capital, by the sale of debentures in the large money markets.

Farmers borrowing from an agricultural credit corporation pay cash for the goods which they buy. This money is usually spent at home and it circulates through several hands in the community before its initial effect is completely exhausted. Most of the farmers' notes discounted by local institutions are classified as livestock paper, the second big classification is for agricultural production purposes, and the third, general agricultural paper. In 1930, approximately $70,000,000 worth of such paper was discounted by the banks against about $60,000,000 the previous year. The paper discounted by agricultural credit corporations in 1930 amounted to approximately $41,000,000 while that of livestock loan companies totaled about $26,000,000, the balance of the business being done with state and national banks.

Credit Organizations Increase

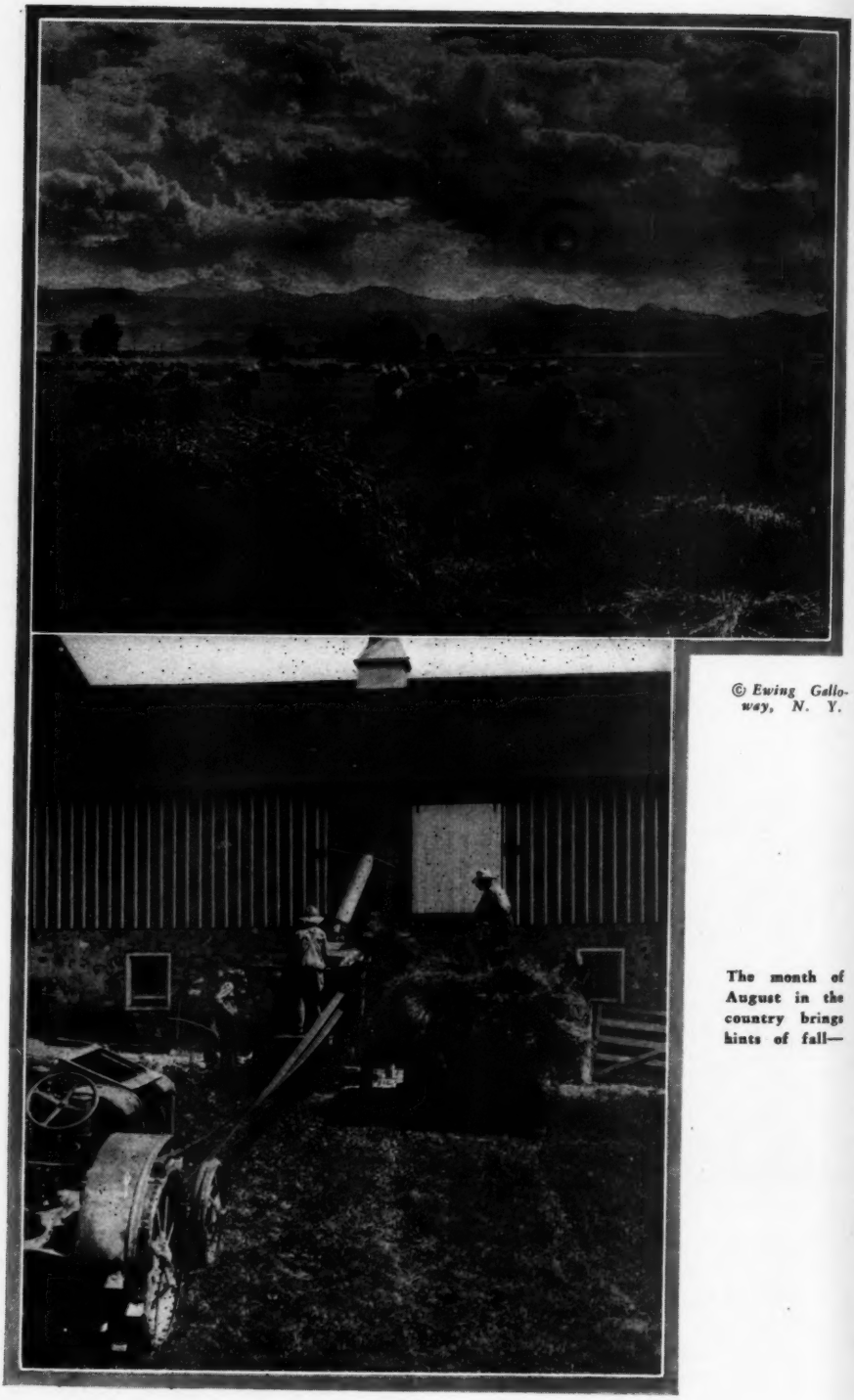
According to the Federal Farm Loan Board's annual report at the turn of the year, there were 475 agricultural credit corporations, 107 livestock loan companies, 196 state banks, and 14 national banks, making a total of 792 local institutions which have discounted paper with the banks since their organization in 1923. The paper handled represents loans to approximately 162,000 farmers. Discounts, including renewals, during 1930 totaled approximately $109,000,000.

Since January, 1931, a rather large number of credit corporations and livestock loan companies have been

(*Turn to page* 51)

ONE JOB THAT LASTS THE YEAR ROUND.

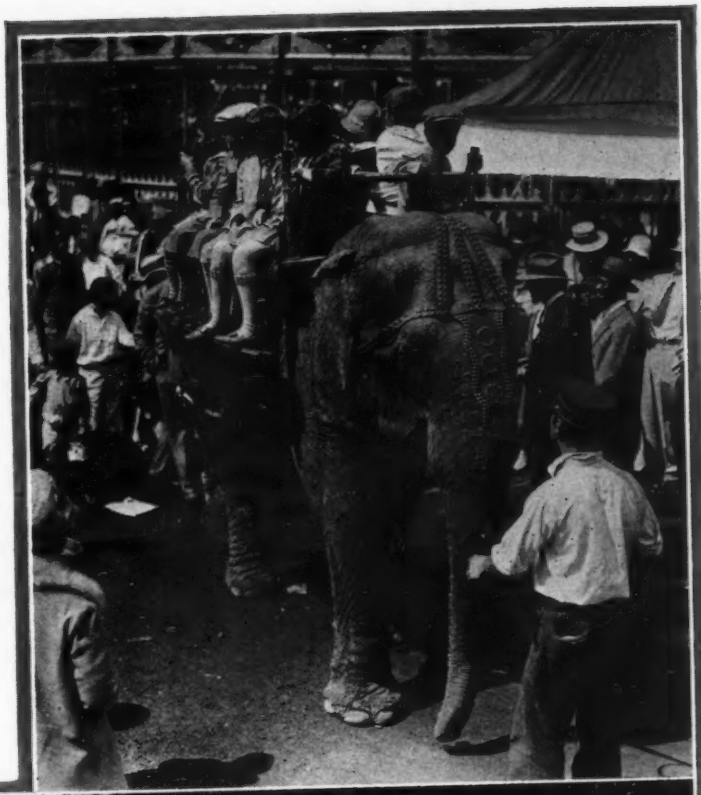
PICTORIAL

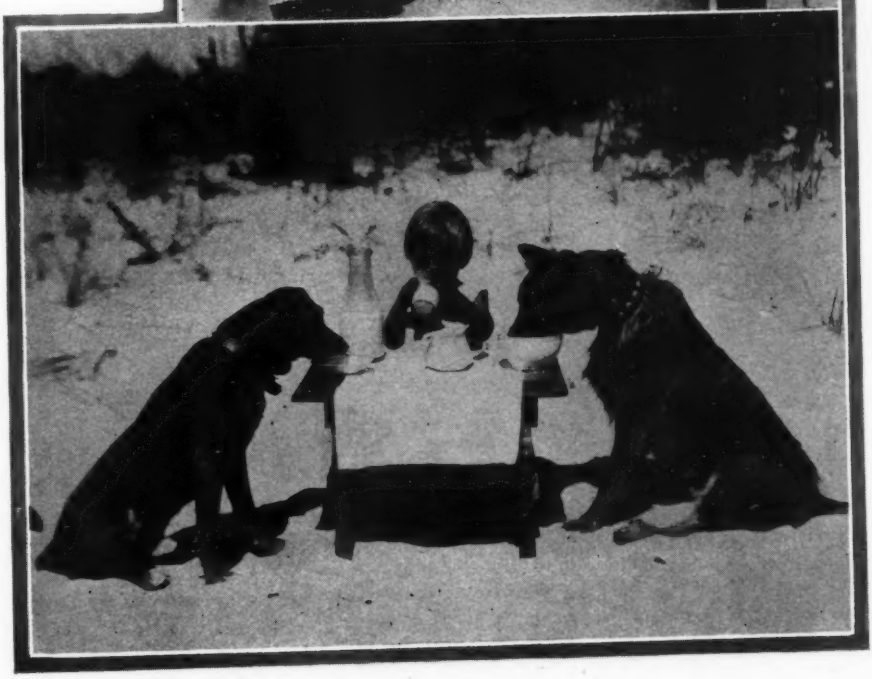


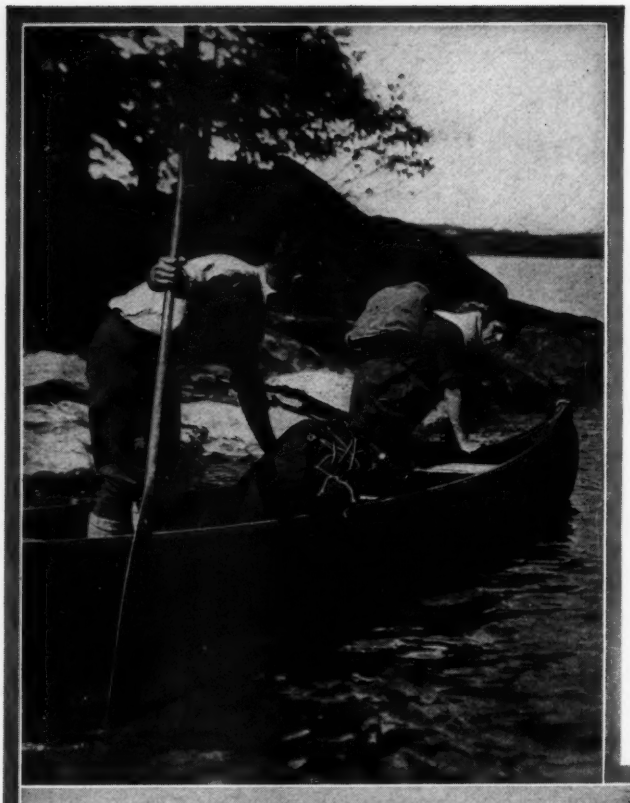
© Ewing Galloway, N. Y.

The month of August in the country brings hints of fall—

Whereas August near the cities is still mid-summer.







Left: Ready to leave the cares and worries of civilization behind.

Below: A quiet twilight on the Ausable river, New York.

Right: Thousands of gannets find a sanctuary on the Gaspe Coast, New Brunswick.

Below: A battered veteran of the high Sierras in Yosemite National Park.

© *Ewing Galloway, N. Y.*

Left: A farmer living near Indianapolis refused $1,600 for this fine walnut tree in his barn lot. The stump alone, according to estimates of woodmen, is worth $500 for manufacturing and veneering. The tree is nearly five feet in diameter and is said to be one of the largest walnuts to remain standing in the Midwest.

Below: The depression among farmers has caused many of them to go back to old methods of conservation. This farm wife is manufacturing soap from the scraps of waste fat saved during the year.

The Editors Talk

Researcher's English

The muse must be cultivated even by scientists. Possibly scientists will yet write poetry, not for the sake of the poetry but for the sake of expressing the idea. For young scientists lack English, says Dr. W. W. Stockberger, Director of Personnel and Business Administration of the Department of Agriculture, as reported in a recent issue of "The Official Record." He points out that a glaring defect in the education of many applicants for professional positions in the government service is an inability to express themselves freely and clearly.

"If a modicum of the time now devoted to the training of students to undertake research work were devoted to training in the art of presenting in suitable form the results of investigation, a marked improvement in the clearness in the writings of students so trained would become evident," according to Dr. Stockberger.

The urgent necessity for the presentation of the results of scientific work in simple and clear language is undoubtedly just as important as undertaking the scientific work itself. Especially is a good presentation necessary if the result of such work is ever to have any influence for the social good.

But between the need and remedy there is a long gap, for everybody with any experience in writing up the results of research work, or for that matter writing up ideas of any sort, for presentation to a reader public knows the difficulty of presentation. Often is it relatively easy to do the work, but presenting the picture resulting from the investigation is quite a different matter. "A modicum" of time spent on English during the period of training might be helpful; certainly a good service will be rendered if leaders in fields of administration point out and emphasize the need for such training in English.

But after all, is it entirely a matter of training in English? Is there not an equal need for cultivating a broad viewpoint? Is not the zeal for specialization in narrow fields of work and the limitation of knowledge to that field partly to blame? Exact knowledge of the narrow field is only of any real value to society when seen against the broad background of human relationships and activity. And probably the present difficulty is to be attributed just as much to a lack of knowledge or even a lack of interest in this broad background, as to a lack of the knowledge of how to use the English language.

Then again, is not our modern tendency to worship unrelated facts partly to blame? Knowledge is not facts alone. Yet only too often are mere facts presented without any relation to a "presiding idea" which the reader can take away. Thus, a marked improvement in scientific writings probably depends not only on a better training in English, but in the cultivation of a broader and more sympathetic viewpoint.

W. J. Spillman Dies

We deeply regret to note that Dr. W. J. Spillman, Principal Agricultural Economist, Division of Farm Management and Costs, Bureau of Agricultural Economics, died suddenly on July 11, following an operation at Garfield Hospital, Washington, D. C. He is survived by his wife and one son, Dr. Ramsay Spillman.

Dr. Spillman was a native of Missouri. In his long career he was Professor of Agriculture at Washington State College, Pullman, from 1894 to 1901. Following this service he was Agrostologist in Charge of Grass and Forage Plant Investigations, Bureau of Plant Industry. When in 1915 the Office of Farm Management was transferred from the Bureau of Plant Industry to the Office of the Secretary, he was placed in charge of it, a position which he held until 1918 when he resigned to become editor of the *Farm Journal*.. In 1921, Dr. Spillman re-entered the Department as Consulting Specialist in the Bureau of Markets and Crop Estimates. In 1924 he was designated as Agricultural Economist in the Bureau of Agricultural Economics and in 1928 as Principal Agricultural Economist.

His chief work was in the field of farm management for which he received world-wide recognition. In 1920, he discovered the mathematical form of the law of diminishing returns with relation to results of the use of fertilizers on farms. Just before his death he had completed a means of solving arithmetically for several variables the exponential yield curve or law of biological growth.

In commenting on Dr. Spillman's death, C. W. Kitchen, Acting Chief of the Bureau of Agricultural Economics, said: "Doctor Spillman's death is a real loss to this bureau. He will be remembered and esteemed for a long time, not only as a pioneer in agricultural economics and particularly in farm management, but also as an inspiring friend and able counselor to many of our research workers. His pioneering did not end when the field to which he contributed so much in its beginning became one of the major fields of agricultural research. He never lost the faculty of taking up new problems with the enthusiasm of youth and of the pioneer. He did this with a rare combination of ability for mathematical exactness and for vivid illustration of his thoughts in writing and on the platform. Some of his work was left unfinished. Fortunately, however, he was able to bring his recent investigations so near to completion that it probably will be possible to publish the more important results substantially in the form in which he left them."

The field of agricultural economics has lost a faithful and far-seeing leader.

The Wheat Situation

In a period of gloom everybody is apt to see the agricultural picture through the eyes of wheat. So much publicity has been given to the wheat situation, so much political activity has centered around wheat that the so-called wheat situation is apt to loom up as a very big part of the agricultural problem.

Undoubtedly wheat is a very important crop and the wheat situation is bad, as bad as it has been for many years. Wheat prices are now at about the level of the '90s, but the situation is worse than this because actually the

prices paid to growers are the lowest in history, because production, transportation, and marketing costs are all higher than they were 40 years ago. Everything possible should be done for the wheat farmer.

At the same time, as pointed out by the Corn Belt Farm Dailies, "It is a serious mistake to judge American agriculture in terms of wheat. Only six to eight per cent of the total value of farm production is wheat. The other 92 to 94 per cent of production is making a better return—some of it a much better return."

About 70 per cent of all farm products find their way to market in the form of livestock and livestock products. Along with this the last decade added 16,000,000 people to the population of the United States. It is estimated that during the coming decade there will be an addition of 13,500,000. The demand for food products will, therefore, slowly but inevitably increase.

The farmer's dollar has already been deflated very considerably. A great deal of quiet but effective reorganization has been accomplished on the individual farms of our land. Though a serious situation still exists, our national agriculture is on a much sounder and more profitable basis than the exponents of wheat relief would always have us admit.

The Use of Fertilizer

Farmers use fertilizers because they hope to make a profit. There is no other argument which is sufficient to insure their long continued use. As R. E. Stephenson, Soil Specialist of the Oregon Experiment Station, points out, "Fertilizers may improve the soil, but unless crop increases and bankable returns are reasonably sure at the same time, few will continue to fertilize simply for soil improvement."

A great deal of reliable data has been published in one place or another showing the returns from the use of fertilizers. But this alone is not sufficient. The production of the whole crop must be made at a profit.

The practical question arises in times of depression—Shall a farmer cut down or eliminate entirely the use of commercial fertilizers? The answer as pointed out by Mr. Stephenson is found in the past. Seldom has anyone lost money by producing big yields and almost never has one profited much from low yields. "It may be desirable to cut down the acreage, but never the acre yields."

As agricultural economists point out, there is one rule to which there is no exception. If a farmer is to make a profit, he must get higher than average yields. It is a hard but fast rule that in spite of overproduction any hope of profit depends upon the highest yield at the lowest cost per unit of production. Therefore, cutting down acreage may be desirable and necessary, but cutting down the use of fertilizers is out of the question for any progressive farmer who can use fertilizers at all in his crop production system. In times of depression the question of the right fertilizers to use and how to use them becomes vastly more important than in times of relative prosperity. It is for these reasons that there are evidences on every hand of an intensified in-

terest in fertility problems.

It is doubly the duty of agricultural advisors and industries selling fertilizers to not only make such materials available to the farmer at the lowest price, but to agree as quickly as possible before the next fertilizer season starts regarding a fertilizer program best calculated to give profitable returns under the present conditions. Such a program suited to the different crop regions should be given every support and broad publicity.

Changing Soils

Soil is a living thing subject to change. It has Youth and Old Age, a process of development and a process of decay.

To tell how old a soil is, look at its face—but in the case of a soil its face is the profile. We used to think that soil was an inert body, the final product, as it were, of long processes of soil-making. But due to recent investigations of soil science, ideas are changing.

What processes modify soils?

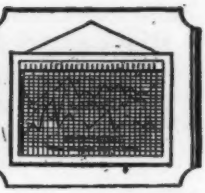
According to Dr. A. G. McCall, Chief of the Soil Investigations Unit of the United States Department of Agriculture, environment is the all-important factor in developing the characteristics of soils and in determining whether they shall be good or bad, fertile or unproductive.

Dr. McCall pointed out to members of the Agricultural Historical Society that the chief stumbling block to our knowledge of soils and to the development of soil science has been the persistent assumption by scientists that soils were chiefly the product of heredity. Continuing, Dr. McCall said: "In the light of progressive scientific discoveries we find it impossible to believe that the 'death' of a soil is necessarily anything more than a stage of coma or suspended animation. Soil surveys are studies of the relationships of soil environment in which their evolution has occurred. Our faith in science is so profound that we believe in the possibility of resuscitating even a dead soil and who knows but that in the near future we may be able to treat dead soils and start them on a brand-new evolutionary course from youth to old age?"

Thus, soils have many ambitions in common with human nature.

"A GROWING fund of basic facts is just as essential to the progress of agriculture and the farm home as it is to industry and to other lines of endeavor. Without research and the application of its results, agriculture will lag. A retarded agriculture affects the whole foundation of our national life. This applies to production, to distribution, and to marketing, as well as to those factors which relate to the health, the social, and the community life of our rural people."—*M. S. McDowell, Director, Pennsylvania Extension Service.*

AGRICULTURAL DEVELOPMENTS



CONCENTRATED FERTILIZERS OFFER ECONOMIES IN FARM PRODUCTION

High-analysis or concentrated fertilizers, if applied effectively, make possible some economies in time and labor which means dollars and cents saved for the farmer. These fertilizers also aid him to decrease his unit cost of production whether it be of a bushel of potatoes, a basket of lettuce, or a crate of cauliflower, Dr. Oswald Schreiner, Chief of the Division of Soil Fertility of the Bureau of Chemistry and Soils, told farmers and fertilizer men at the soil and fertilizer meeting at the Virginia Polytechnic Institute at Blacksburg, Va., July 10.

"The economic advantages of concentrated chemical fertilizers deserve serious consideration," said Doctor Schreiner. "Less handling, hauling, and storage are required at the factory or mixing plant for concentrated fertilizers. Fewer bags are needed. A marked reduction in freight is made possible. After the fertilizer reaches the farmer less handling, hauling, and storage are involved. At planting time fewer trips are required to haul the fertilizer to the field and the bags can be set from two to three times farther apart. Considering the entire range in cost involved, concentrated fertilizers offer a good chance to effect definite economies in crop production."

Doctor Schreiner says that concentrated fertilizers can be delivered to the farmer at less cost per unit of plant food than ordinary-strength fertilizers; can be prepared and delivered to the farmer in good physical condition which makes it possible to apply the fertilizer uniformly and without waste; and, on soils with high water-holding capacity and well-distributed rainfall, will give as satisfactory yields as ordinary-strength fertilizers. He warned, however, that on lighter soils where drought is likely there is greater chance of injury to plants from the more highly concentrated fertilizers.

He announced that triple-strength fertilizer mixtures prepared in the fertilizer house of the Bureau of Chemistry and Soils in Washington were used successfully a month or two later by potato growers in Aroostook county, Maine, with regular potato-planting machinery and standard fertilizer attachments without trouble and with uniform applications.

CORRESPONDENCE COURSES PENNSYLVANIA STATE COLLEGE

A new free correspondence course in potato growing prepared by Dr. E. L. Nixon, research plant pathologist at the Pennsylvania State College, will soon be available, the College announces.

The new course will cover seed selection and care, soil preparation and tillage, harvesting and handling the crop for economical potato production.

Various other free home study courses are offered in other subjects. A printed college bulletin containing descriptions of all the courses and other useful information about the work will soon come from the press and be available for free distribution. —*Marketing Activities, July* 22, 1931.

THE SO-CALLED KALAMATI DISEASE OF SUGAR CANE

V. J. Koningsberger and T. H. van den Honert Arch. Suikerind. Ned.—Indie Vol. 39, 1931

THE Kalamati disease of sugar cane is defined by Wilbrink as a stagnation or arrested growth of the young cane plants, leaves with more or less elongated dark red spots. The affected cane may apparently throw off the disease when the rains come, but the yield is low and there is a tendency to early death. Wilbrink showed that the disease did not occur in pot tests where potash was added to the Kalamati soil, and this result was later confirmed by field experiments.

However, certain facts in the case appeared to render doubtful the theory that the phenomenon was due to a simple lack of a particular plant food, in this case potash. The disease appeared to be confined to the Kalamati soil type, which is a laterite with considerable oxide of iron in the upper horizons of the subsoil, where anerobic (reducing) conditions also prevail to some extent. This suggested the possibility of the presence of soluble ferrous salts under certain circumstances. Pot cultures were made in which soluble ferrous salts could be produced from free iron oxide in the presence of ammonium sulphate used as a plant food. Under these conditions young sugar cane plants exhibited the symptoms of the Kalamati disease, but when the same cultures received an addition of potash the phenomena did not appear.

It thus appears that the Kalamati disease is not a nutritional disease, but is a result of iron poisoning, and that the counter action of potash represents a case of physiological antagonism by which the toxic effect of the iron is inhibited.

The Kalamati disease is more apt to be met with in the case of cane that has been fertilized with ammonia sulphate than where sodium nitrate is used. In the former case the sulphate ion may bring iron in solution, which the sodium ion does not do.—*"Facts About Sugar,"* May, 1931.

SALT WILL KILL WILD GOURD ROOTS

A pint of ordinary salt poured into a hole cut in the side of the immense roots of wild gourd or man-in-the-ground is a cheap and effective way to rid land of this serious weed pest. A. R. Cadle, farmer of Polk county, Oregon, tried it out on 150 plants of this pest a year ago with almost 100 per cent kill.

First, the dirt is scraped away until the top of the immense root is laid bare. A hole is bored into the top of the root with an ordinary post-hole digger and a pint, more or less, of salt is poured into this hole and is covered up.

According to Mr. Cadle, a man can treat about 75 of these plants a day. Last year they were treated during the latter part of June. The wild gourd has a root on it as big as a wash-tub or a bushel box, and it uses a great deal of moisture and sends out huge, long vines that twine around the ground and makes it difficult to grow a successful crop in the immediate vicinity. Ordinary weed killers are not successful because of the immense storage capacity of this root.

—J. R. Beck, Dallas, Oregon.

FADING SOIL MEANS FADING OF PROFITS

When the color of a soil begins to change from dark to light, the farmer should look out. A change in the other direction—from light to dark—usually indicates improvement, more organic matter. But a fading soil in most cases means fading crop returns. In central Texas the rolling black lands—uniformly black—have faded in many places to gray, yellow, and

even almost white, as if something had drawn the life blood. And erosion has done just that.

Erosion, speeded up by cultivation, has profoundly altered soil conditions in the Texas black lands, the Bureau of Chemistry and Soils of the United States Department of Agriculture has found. This land in a virgin condition produced from ½ to 1 bale of cotton per acre without manure or fertilizer of any kind.

Now the region is a mixed black, gray, yellow, and white area, so rapidly has erosion skinned off the successive layers of soil from black, almost superproductive clay on top, down to white, comparatively unproductive subsoil. This change has occurred in 40 years of cultivation.

This damage has been caused chiefly by sheet erosion, scarcely noticeable as it takes place, but which carries off a portion of the essential topsoil every time there is a rain.

Twenty-three tons of topsoil were removed from each acre by a single rain, measurement on an average slope showed. This single rain affected 3,000,000 acres of Texas land.

Department soil specialists warn that unless vastly more is done in the future to protect the erosive slopes of Texas than has ever been done in the past the rolling areas of this great cotton-producing belt are doomed to destruction.

AVOID DROUGHT EFFECTS BY KEEPING PLANTS DRIER

Wet fields and marshy spots are often the first to show the effects of dry weather. A lawn that is sprinkled every day suffers more, if the family goes on vacation and neglects the sprinkling, than a near-by lawn that has had to depend on rain for most of its moisture.

Last year's long drought emphasized this, both in town and country. This results from the general habit of plants to take life easy and to develop along lines of least resistance. In a marsh or a wet field the surface moisture is almost always adequate, and roots develop near the surface because they do not need to seek moisture and plant food in the lower levels. Ordinarily roots do not grow well in water-logged soil. When the surface dries out, the plant may be unable to tap the water in the subsoil. Similarly the well-sprinkled lawn develops a root system just beneath the surface, and if the upper layer of soil dries the lawn may soon look bare and brown.

In the wet or marshy fields the remedy is paradoxically, to fight drought by keeping the fields drier, usually by drainage which will favor a deeper rooting. On the lawn, also, the remedy is to apply less water—less frequently but more water at a time, enough to soak the soil to a depth of several inches. Then, when the surface water evaporates, the roots of the grasses push downward to tap reserves of moisture.

TECHNICAL TESTS USED IN GRADING FARM PRODUCTS

Mechanical and chemical tests are rapidly replacing human judgment in measuring the quality of farm products. Ten years ago, says the United States Department of Agriculture, only a few such tests were used successfully. To-day many products are tested chemically or mechanically, by methods that give to particular quality factors a specific value in commodity standards.

One device recently developed measures the moisture content of grain by recording the resistance offered to an electric current passed through it. This method requires only 30 seconds, as compared with the 40 minutes necessary under the old method.

Technical tests are employed in

measuring certain quality factors in fruit. The sugar content of grapes is determined by the saccharimeter. A sugar acid test is used to ascertain the maturity of citrus fruits. A specific gravity test shows the maturity of cantaloupes.

In grading canned fruits and vegetables a pressure gauge indicates the vacuum condition of the can. The density of sirups is tested with hydrometers. Salinometers are used in testing brine solutions, and penetrometers in determining the consistency of such products as canned pumpkin. Mechanical devices measure the maturity of canned corn. A fruit pressure tester has been developed to determine the maturity of plums, apples, and pears. The colorimeter measures color in hay, cotton, and honey, in which product's color is an important quality factor.

Cotton fiber lengths are measured with a high degree of accuracy by an improved cotton fibre sorting machine. The strength of cotton fibers may be ascertained by the bundle fiber test.

Some quality factors, such as flavor and odor, are naturally difficult to measure by technical tests, though means for doing so may some day be developed. Research on this problem is under way. The progress already made in the measurement, by technical means, of specific quality factors suggests that dependence on personal judgment or skill, though still necessary to a considerable degree, may eventually be largely eliminated. This elimination will make grading increasingly uniform throughout all seasons and areas.

HARDISTAN ALFALFA

Hardistan is the name of a new variety of alfalfa which recently has been named by the Nebraska Experiment Station at Lincoln. This new variety was found growing on the farm of Arnold Brothers in Dawson county, Nebraska. Its chief value compared to other varieties is that it is extremely winter hardy and resistant to the bacteria which cause alfalfa wilt.

Hardistan is thought to have originated from Turkestan alfalfa. This new variety has been growing on the same field for nearly 20 years. It does not resemble Turkestan alfalfa as much as the Common variety. Experimental work and observation show that the variety gives satisfactory hay and seed yields under Nebraska conditions. The supply of seed is limited, but the Nebraska Crop Growers' Association at Lincoln is planning to grow certified seed of the new variety.

The name Hardistan is a combination of the two words "hardy" and "Turkestan." Of course seed of this variety cannot be distinguished from other varieties of alfalfa. Growers who desire to try the new variety, therefore, should be sure of the source of the seed.—*E. N. Bressman.*

A DISEASE-RESISTANT TOMATO

Marglobe is the name of a disease-resistant variety of tomatoes originated by the United States Department of Agriculture by crossing two varieties, Globe and Marvel. The name of the new variety is a combination of the parental names. Marglobe has the best characteristics of its two parents.

This variety is of chief interest to tomato growers in Florida and other Gulf States where Fusarium wilt, nailhead rust, and puffiness cause considerable trouble. It has possibilities as a late tomato in other sections. Marglobe is resistant to these diseases and in addition produces a very smooth, globe-shaped fruit which is free from irregularities.

Marglobe has been readily accepted by tomato buyers. The fruits ripen slowly and uniformly. Also they stand shipping and storing better than many of the older varieties. Of great importance is the availability of seed of Marglobe. Most seed houses are able to furnish seed of this variety.—*E. N. Bressman.*

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

A very interesting summary of several years' work with fertilizers on cotton on many soils in Mississippi has been prepared by the Agronomy Department of the Mississippi Agricultural Experiment Station in Bulletin No. 289, entitled "Commercial Fertilizers For Cotton—1925 to 1930." Based on these results, fertilizer recommendations for the various groups of soils in the State are made, which should help growers to select analyses best suited to their conditions. The work is analyzed from a profit as well as from a yield viewpoint, so that the conclusions reached can be applied directly by the farmer.

The proper fertilizers for market garden and other cash crops are discussed in a well-prepared publication by F. L. Musbach and C. J. Chapman, entitled "Fertilizers for Cash Crops," Wisconsin Agricultural Experiment Station Circular 243. Cabbage, onions, potatoes, sugar beets, and canning peas are considered separately, and such analyses as 5-8-7, 6-15-12, 3-12-12, 2-16-8, 3-20-20, 0-20-20, and 0-15-30 are mentioned among others of similar ratios as being suited for the various crops on different soils. Recommended rates of application vary from 300 to 1,200 pounds per acre. A helpful section on fertilization of lawns is added, in which such analyses as 6-15-9 and 5-8-7 at 3 pounds per 100 square feet in the spring and several top-dressings during the summer of 5 pounds of a nitrogen fertilizer dissolved in 20 gallons of water and sprinkled over 1,000 square feet are recommended. This circular is valuable to all interested in growing the crops discussed.

"Cotton Fertilizer Experiments, 1930—Sources of Nitrogen, Supplements, and Time and Method of Application," Agr. Exp. Sta., Experiment, Ga., Cir. 91, Dec., 1930, G. A. Hale.

"Fertilizing Tomatoes, Sweet Corn, and Muskmelons in a Three-Year Rotation," Agr. Exp. Sta., Urbana, Ill., Bul. 364, Jan., 1931, J. W. Lloyd.

"The Potassium, Chlorine and Sulfate Content of Kentucky Tobacco as Related to Grade," Agr. Exp. Sta., Lexington, Ky., Bul. 308, July, 1930, O. M. Shedd.

"A Preliminary Report of Certain Variety and Fertilizer Tests," Agr. Exp. Sta., Baton Rouge, La., 1930.

"Inspection of Commercial Fertilizers for 1930," Agr. Exp. Sta., Durham, N. H., Bul. 254, Dec., 1930, T. G. Phillips, T. O. Smith, and S. J. Fisher.

"The Preservation of Manure Under Arid Climatic Conditions," Agr. Exp. Sta., State College, N. M., Bul. 190, Feb., 1931, H. N. Watenpaugh.

"Nitrogen and Organic Matter in the Soil," State College of Agr., Ithaca, N. Y., Bul. 201, Dec., 1930, A. F. Gustafson.

"Fertilizing Vegetable Crops," Pennsylvania State College, State College, Pa., Cir. 138, Apr., 1931, Jesse M. Huffington.

"The Fertilizer Problem in South Carolina," Clemson Agr. College, Clemson, S. C., Cir. 107, Dec., 1930, R. W. Hamilton.

"Increasing the Profits from Phosphates for Tennessee Soils," Agr. Exp. Sta., Knoxville, Tenn., Cir. 34, Jan., 1931, C. A. Mooers.

Soils

"A Study of Factors Influenzing Inoculation Experiments with Azotobacter," Agr. Exp. Sta., Manhattan, Kansas, Tech. Bul. 26, Aug., 1930, P. L. Gainey.

"Influence of Various Non-nitrogenous Compounds on the Growth of Certain Bacteria in Soils of Low Productivity," N. Y. State Agr. Exp. Sta., Geneva, N. Y., Tech. Bul. 172,

Dec., 1930, H. J. Conn and Mary A. Darrow.

"Preparation of Soil Profiles for Exhibition and Soil Study," N. Y. State Agr. Exp. Sta., Geneva, N. Y., Tech. Bul. 173, Dec., 1930, R. C. Collison and J. D. Harlan.

"The Effects of Certain Soil Conditions on the Yield and Quality of Burley Tobacco," Agr. Exp. Sta., Knoxville, Tenn., Cir. 33, Dec., 1930, C. A. Mooers.

Crops

Sixteen annual and two biennial reports are to be found listed below. These publications, containing the results of latest experimental work, will receive the keen interest of all who are keeping up with the progress of scientific agriculture.

Four publications dealing with vegetable gardening have also recently come into circulation and are to be found listed below. It would seem that more and more attention is being given the garden as an asset in farm and home budgeting.

An addition to the pasture literature is Michigan Extension Bulletin 114, "Suggestions for Better Pastures in Michigan," by E. L. Anthony, H. C. Rather, and C. E. Millar. The question of fertilization of pastures is well discussed and the statement made, "Experimental results suggest that not less than 300 pounds and preferably 500 to 1,000 pounds per acre of the complete fertilizer should be applied from 4 to 5 weeks before it is desired to turn the stock on the pasture in the spring.

A discussion of the fertilization of orchards, a subject receiving growing interest, is to be found in a new publication, Bulletin No. 73, by J. F. Rosborough, Horticulturist, and issued by The Extension Service of the Agricultural and Mechanical College of Texas. Complete fertilizers are recommend as follows: "In using commercial fertilizer to stimulate growth on one-year trees, ¾ to 1 pound per tree of a 6-12-6 or a 6-9-3; for second and third year trees, 1 to 2 pounds per tree of a 6-12-6 or 6-9-3. When fruit trees come into production, stable manure, to which has been added 100 pounds of superphosphate per wagon load (a ton) applied at the rate of 1 to 10 tons per acre is recommended. Commercial fertilizer mixtures such as 6-12-6 or 6-9-3 applied to each tree at the rate of 1 to 2 pounds per inch diameter of the body of the trees are also recommended.

"Report of the Agricultural Experiment Station of the University of California, July 1, 1929, to June 30, 1930," Univ. of Calif., Berkeley, Calif., 1931.

"Report of the Director, Year Ending October 31, 1930," Agr. Exp. Sta., New Haven, Conn., Bul. 322, Jan., 1931.

"Chemical Investigations of the Tobacco Plant, I. A Preliminary Study of the Non-Volatile Organic Acids of Tobacco Leaves," Agr. Exp. Sta., New Haven, Conn., Bul. 323, Jan., 1931, Hubert Bradford Vickery and George W. Pucher.

"Chemical Investigations of the Tobacco Plant, II. The Chemical Changes That Occur During the Curing of Connecticut Shade-Grown Tobacco," Agr. Exp. Sta., New Haven, Conn., Bul. 324, Jan., 1931, Hubert Bradford Vickery and George W. Pucher.

"Annual Report of the Director, For Fiscal Year Ending June 30, 1930," Agr. Exp. Sta., Newark, Del., Bul. 167, Nov., 1930.

"Forty-Third Annual Report—1930," Agr. Exp. Sta., Experiment, Ga.

"Cultivated Berries," Agr. Exp. Sta., Experiment, Ga., Bul. 166, Jan., 1931, J. G. Woodroof.

"Tenth Annual Report—1920," Georgia Coastal Plain Exp. Sta., Tifton, Ga., Bul. 12, June, 1930.

"Cotton Production in the Coastal Plain of Georgia," Agr. Exp. Sta., Tifton, Ga., Bul. 13, June, 1930, W. J. Davis.

"Corn Production in the Coastal Plain of Georgia," Agr. Exp. Sta., Tifton, Ga., Bul. 14, 1930, W. J. Davis.

"Agricultural Experiment Station Report for the Fiscal Year Ending June 30, 1930," Univ. of Fla., Gainesville, Fla.

"Crops to Replace Spring Wheat in Northern Idaho," Agr. Exp. Sta., Moscow, Idaho, Bul. 177, Feb., 1931, H. W. Hulbert.

"Grains for the Cut-Over Lands of Northern Idaho," Agr. Exp. Sta., Moscow, Idaho, Bul. 178, Jan., 1931, J. H. Christ.

"Apple Breeding in Idaho," Agr. Exp. Sta., Moscow, Idaho, Res. Bul. 8, Nov., 1930, C. C. Vincent and L. E. Longley.

"Strawberries for Home and Market," Agr. Exp. Sta., Lafayette, Ind., Bul. 174, Mar., 1931, Monroe McCown and Clarence E. Baker.

"Harvesting Cornstalks for Industrial Uses," Agr. Exp. Sta., Ames, Iowa, Bul. 274, Nov., 1930, J. Brownlee Davidson and Edgar V. Collins.

*"Fifth Biennial Report of the Director,"

Agr. Exp. Sta., Manhattan, Kan., Dec., 1930.

"Flower Gardening in Maine," Univ. of Maine, Orono, Me., Bul. 197, Feb., 1931, Roger Clapp and Edna Cobb.

"Annual Report of the Maine Extension Service for the Year Ending June 30, 1930," Univ. of Maine, Orono, Me., Bul. 198, Mar., 1931.

"The Home Garden," Agr. College, Amherst, Mass., Ext. Leaflet 59, Jan., 1931, P. W. Dempsey, G. B. Snyder, C. L. Thayer, and W. H. Thies.

"Black Raspberry Studies," Agr. Exp. Sta., East Lansing, Mich., Tech. Bul. 111, Feb., 1931, Roy E. Marshall.

"Agricultural Experiment Station Report Two Years Ended June 30, 1930," Mich. State College, East Lansing, Mich.

"A Comparison of Alfalfa Strains and Seed Sources for Michigan," Agr. Exp. Sta., Lansing, Mich., Spec. Bul. 211, Jan., 1931, C. R. Megee.

"The Quarterly Bulletin," Agr. Exp. Sta., East Lansing, Mich., No. 4, Vol. XIII, May, 1931.

"American Potato Journal," The Potato Association of America, East Lansing, Mich., No. 6, Vol. VIII, June, 1931.

"Agricultural Experiment Station, Thirty-Eighth Annual Report, July 1, 1929, to June 30, 1930," Univ. of Minn., St. Paul, Minn.

"Mississippi Agricultural Experiment Station Forty-Third Annual Report for the Fiscal Year Ending June 30, 1930," A. and M. College, Miss.

"Report of the South Mississippi Branch Experiment Station," A. and M. College, Miss., Bul. 285, Dec., 1930, J. C. Robert, W. W. Welborne, and J. L. Cooley, Jr.

"Report of the Raymond Branch Experiment Station," Agr. Exp. Sta., A. and M. College, Miss., Bul. 287, Dec., 1930, H. W. Wallace.

"Cotton Variety Summary 1926-1930," Agr. Exp. Sta., A. and M. College, Mich., Bul. 288, Dec., 1930, J. F. O'Kelly and W. W. Hull.

"One Year's Progress in Missouri Agriculture," Mo. Col. of Agr., Columbia, Mo., Cir. 269, Feb., 1931, R. R. Thomasson.

"Top-Dressing Old Pastures," Agr. Exp. Sta., Durham, N. H., Sta. Cir. 35, Feb., 1931, Ford S. Prince, Paul T. Blood, and G. P. Percival.

"Vegetable Gardening in New Hampshire," Ext. Serv., Durham, N. H., Ext. Bul. 25, Mar., 1931, J. R. Hepler.

"Forty-First Annual Report Agricultural Experiment Station of the New Mexico College of Agriculture and Mechanic Arts," State College, N. M.

"Important Considerations in Pear Production," State College of Agriculture, Ithaca, N. Y., Bul. 203, Jan., 1931, G. W. Peck, C. R. Crosby, W. E. Blauvelt, M. F. Barrus, W. D. Mills, and T. E. LaMont.

"Emergency Forage Crops—An Outline for Their Protection," State College, Ithaca, N. Y., Bul. 209, Apr., 1931, John H. Barron.

"Yields and Practices in the Ohio 10-Acre Corn Project, (1920-1928), State Univ., Wooster, Columbus, O., J. A. Slipher and E. P. Reed.

"The Farm Vegetable Garden," State College, Corvallis, Ore., Ext. Bul. 432, Jan., 1931, A. G. B. Bouquet.

"Bleaching and Dyeing Royal Ann Cherries for Maraschino or Fruit Salad Use., Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 275, May, 1931, D. E. Bullis and E. H. Wiegand.

"Forty-Third Annual Report of the South Carolina Experiment Station of Clemson Agricultural College, Year Ended June 30, 1930," Clemson College, S. C., Dec., 1930.

"The South Carolina Agricultural Experiment Station, A Brief History, 1887-1930," Cir. 44, Dec., 1930, G. H. Aull.

"The Grade and Staple of South Carolina's 1930 Cotton Crop," Agr. Exp. Sta., Clemson College, S. C., Cir. 47, Apr., 1931, Harry A. White.

"The Cotton Contest—1930 For Better Yield and Staple Value," Agr. College, Clemson College, S. C., Cir. 110, Jan., 1931, R. W. Hamilton.

"The Sweet Potato Contest, 1930," Agr. College, Clemson College, S. C., Cir. 111, Jan., 1931, L. P. Watson.

"Annual Report of the South Dakota Agricultural Experiment Station for Fiscal Year Ending June 30, 1930," State College, Brookings, S. D.

"A Decade of Crop Yields from Vivian Farm," Agr. Exp. Sta., Brookings, S. D., Bul. 253, July, 1930, A. N. Hume.

"The Tokio Soybean," Agr. Exp. Sta., Knoxville, Tenn., Cir. 35, Feb., 1931, C. A. Mooers.

"Tomatoes In Texas," A. and M. College, College Station, Tex., C-62 Apr., 1931, J. F. Rosborough.

"Making Good With Pastures," A. and M. College, College Station, Tex., C-79, Mar., 1931, E. A. Miller.

"Growing Asparagus," A. and M. College, College Station, Tex., C-82, Feb., 1931, J. F. Rosborough.

"Demonstration Outline for Irish Potato Production," A. and M. College, College Station, Tex., C-85, Mar., 1931, R. R. Reppert.

"Better Sugar-Beet Culture for Utah," Agr. Exp. Sta., Logan, Utah, Cir. 93, Apr., 1931, George Stewart and D. W. Pittman.

"Alfalfa-Seed Production," Agr. Exp. Sta., Logan, Utah, Bul. 226, May, 1931, J. W. Carlson and George Stewart.

"A Study of Natural Reproduction in Vermont Forests," Agr. Exp. Sta., Burlington, Vt., Bul. 311, July, 1930, George P. Burns and Wallace E. White.

"Topworking the Apple Tree," Agr. Exp. Sta., Morgantown, W. Va., Cir. 57, Nov., 1930, M. B. Hoffman.

"Effects of Pruning on Growth and Yield

of Cherry Trees," Agr. Exp. Sta., Morgantown, W. Va., Bul. 240, Mar., 1931, H. L. Crane.

"Four-H Club Work in West Virginia," Agr. Exp. Sta., Morgantown, W. Va., Bul. 241, Apr., 1931, T. L. Harris.

"Fortieth Annual Report of the University of Wyoming Agricultural Experiment Station, 1929-1930," Laramie, Wy.

"Home Gardening in the South," U. S. D. A., Washington, D. C., Farmers' Bul. 934, Mar., 1931, H. C. Thompson.

"How to Grow an Acre of Potatoes," U. S. D. ,A., Washington, D. C., Farmers' Bul. 1190, Mar., 1931, William Stuart.

"Effective Haying Equipment and Practices," U. S. D. A., Washington, D. C., Farmers' Bul. 1525, Mar., 1931, L. A. Reynoldson, and C. D. Kinsman.

"Farm Study of the Cotton Plant," U. S. D. A., Washington, D. C., Farmers' Bul. 1661, Mar., 1931, J. W. Hubbard.

"Reproduction on Pulpwood Lands in the Northeast," U. S. D. A., Washington, D. C., Tech. Bul. 223, Feb., 1931, Marinus Westveld.

"The Time to Harvest Fiber Flax," U. S. D. A., Washington, D. C., Tech. Bul. 236, Apr., 1931, Brittain B. Robinson.

Economics

"Series on California Crops and Prices, Olives," Agr. Exp. Sta., Berkeley, Cal., Bul. 510, Mar., 1931, H. R. Wellman.

"Farm Prices of Cotton Related to Quality, Georgia Crop—1928-29," Agr. Exp. Sta., Experiment, Ga., Bul. 165, Sept., 1930, L. D. Howell and W. T. Fullilove.

"Some Evidences of Agricultural Progress," Agr. Exp. Sta., Urbana, Ill., Cir. 365, Feb., 1931, H. W. Mumford.

"Agricultural Outlook for Illinois, 1931," Agr. Exp. Sta., Urbana, Ill., Cir. 366. Feb. 9, 1931, H. W. Mumford.

"Prices of Illinois Farm Products in 1930," Agr. Exp. Sta., Urbana, Ill., Bul. 365, Feb., 1931, L. J. Norton.

"Types of Farming in Kansas," Agr. Exp. Sta., Manhattan, Kan., Bul. 251, Aug., 1930, J. A. Hodges, F. F. Elliott, and W. E. Grimes.

"The Agricultural Credit Situation in Kentucky," Agr. Exp. Sta., Lexington, Ky., Bul. 311, Dec., 1930, H. B. Price, C. J. Bradley, and E. C. Johnson.

"Making Cotton Cheaper—Can Present Production Costs Be Reduced?" Delta Exp. Sta., Stoneville, Miss., Bul. 290, Feb., 1931, M. G. Vaiden, J. O. Smith, and W. E. Ayres.

"A Five-Year Economic Study of 125 Farms in Curry and Roosevelt Counties, New Mexico," Agr. Exp. Sta., State College, N. M., Bul. 186, June, 1930, L. H. Hauter, A. L. Walker, and O. V. Wells.

"Production Requirements, Costs, and Returns from Dry-Land Farming in Eastern New Mexico," Agr. Exp. Sta., State College, N. M., Bul. 187, June, 1920, L. H. Hauter, A. L. Walker, and O. V. Wells.

"Selecting the Most Profitable System of Dry-Land Farming in Eastern New Mexico," Agr. Exp. Sta., State College, N. M., Bul. 188, Jan., 1931, L. H. Hauter, A. L. Walker, and O. V. Wells.

"The New York State 1931 Agricultural Outlook," Cornell Univ., Ithaca, N. Y., Bul. 207, Feb., 1931, M. C. Bond, L. M. Vaughan, and L. E. Cruikshank.

"Piedmont Farm Management for 1931," Agr. Exp. Sta., Clemson College, S. C., Cir. 46, Feb., 1931, W. C. Jensen and B. A. Russell.

"Agricultural Outlook for South Carolina, 1931," Clemson College, S. C., Cir. 108, Dec., 1930.

"Pee Dee Farm Management Studies, 1925-30," Agr. Exp. Sta., Clemson College, S. C., Bul. 269, Jan., 1931, W. C. Jensen and B. A. Russell.

"Cotton Marketing Studies, 1925-1930, Agr. Exp. Sta., Clemson College, S. C., Bul. 270, Jan., 1931, Ward C. Jensen, Marvin Guin, and Harry A. White.

"Marketing Apples Grown in the Cumberland-Shenandoah Region of Pennsylvania, Virginia, and West Virginia," U. S. D. A., Washington, D. C., Tech. Bul. 234, Mar., 1931, Carl R. Swinson, J. J. Vernon, F. F. Lininger, F. P. Weaver, and A. J. Dadisman.

Insects

"Drouth Checks Corn Borer Adance in 1930," Agr. Exp. Sta., Urbana, Ill., Cir. 367, W. P. Flint, W. P. Hayes, G. H. Dungan, and A. L. Young.

"European Corn Borer Control-Progress Report, 1931," Agr. Exp. Sta., Lafayette, Ind., Cir. 178, Jan., 1931, H. J. Reed.

"Dusting for Boll Weevil Control, Agr. Ext. Serv., Raleigh, N. C., Cir. 186, May, 1931, C. H. Brannon.

"Control of the Codling Moth in the Pacific Northwest," U. S. D. A., Washington, D. C. Farmers' Bul. 1326, Mar., 1931, E. J. Newcomer, M. A. Yothers, and W. D. Whitcomb.

Diseases

"The Relation of Some Tobacco Viruses to Potato Degeneration," Agr. Exp. Sta., Lexington, Ky., Bul. 309, July, 1930, W. D. Valleau and E. M. Johnson.

"Diseases of Boxwood," "Diseases of Carnations," "Diseases of China Asters," "Diseases of Chrysanthemums," "Diseases of Delphinium or Larkspur," "Diseases of Gladiolus," "Diseases of Hollyhocks," "Diseases of Iris," "Diseases of Laurel," "Diseases of Peonies," "Diseases of Perennial and Annual Phlox," "Diseases of Roses," "Diseases of Snapdragons," "Diseases of Sweet Peas," "Diseases of Tulips," Agr. Exp. Sta., New Brunswick, N. J., Cir. 230 to 244 inclusive, Apr., 1931, Richard P. White.

"Cucumber Disease Investigations on Long Island," Agr. Exp. Sta., Geneva, N. Y., Bul. 590, Jan., 1931, E. E. Clayton.

"Seed Treatment for the Control of Oat Smut," Agr. Exp. Sta., State College, Pa., Cir. 136, Mar., 1931, R. S. Kirby.

"Profitable Potato Spraying," Agr. Exp. Sta., Div. of Agr. Ext., State College, Pa., Cir. 137, May, 1931, L. T. Denniston and H. E. Hodgkiss.

"Potato and Cabbage Diseases and Their Control," Agr. Ext. Serv., Knoxville, Tenn., Pub. 167, Mar., 1931, S. H. Essary.

"Sweet Potato Black Rot and Its Control," Agr. Ext. Serv., Knoxville, Tenn., Pub. 168, Mar., 1931, C. D. Sherbakoff.

"Canker Treatment for Fire-Blight Control," Agr. Exp. Sta., Knoxville, Tenn., Cir. 36, Mar., 1931, J. A. McClintock and H. L. Fackler.

"Truck Crop Investigations — Further Studies of Truck Crop Aphids," Truck Exp. Sta., Norfolk, Va., Bul. 71, Apr. 1, 1930, George E. Gould.

"Save Black Walnut from Canker," Agr. Exp. Sta., Morgantown, W. Va., Cir. 58, Dec., 1930, C. R. Orton and J. M. Ashcroft.

Why Raise Food for Bugs

(*From page* 22)

breed up at a rapid rate. Due to international shipping and travel, pests have come in from all over the world. The pink boll-worm, boll-weevil and Mexican bean beetle have just flown across the Mexican border. The other pests have come in on some shipment.

No doubt our failure to protect birds aids materially in the increase of insect pests. This is a problem that should be given serious thought by the entire nation.

The problems are so numerous, the pests breed up so fast that the entire field of insect pest control is peculiarly difficult to attack.

Huxley, the great English genius, estimated that a species of plant lice, (*in the absence of parasites*) in one season would reach the number of 564,087,257,509,154,652. These would weigh 822 million tons or 10 times the weight of the entire population of the earth. It has been found since that Huxley's figures are far short of the actual rate of increase. This impresses upon us the importance of insect enemies.

The Panama Canal has its very foundation laid upon insect control. The French who first started the Canal died like rats and were forced to abandon the project because of the dreaded yellow fever and malaria spread by mosquitoes. Americans first controlled the mosquitoes then built the Canal. The Canal Zone today is a veritable health resort.

Insects are our greatest enemies. They eat what we eat, directly or indirectly. They are all over the face of the earth, they are constantly increasing. It is estimated that there are over 2,000,000 species of insects and only 600,000 of these have been studied. Insects often average more than 15,000,000 per acre of meadow. Forests frequently average over 2,000,000 insects per acre.

All problems are not solved, but there is an efficient, practical control for many pests. Do we intelligently put into practice the controls that we have? The great scourges of the human race have been due to lack of information and failure to apply that which we know. We must stick to the facts. The nation which stays closest to the facts will make the greatest progress in the future. This is true of the individual grower. Surely we should carefully use the effective, economical controls which are known. There is a pest for practically every crop grown. These pests are constantly increasing. Insect pest control, therefore, must be considered as a regular part of the crop system. Why continue to grow any crops for bug food?

Successful Potato Marketing

By E. W. Holden

County Agent, Merrimack County, New Hampshire

A POTATO-MARKETING unit started in 1929 by six Merrimack county, New Hampshire, potato growers has stabilized a marketing condition for growers of this section which appeared to have a dubious future.

This section had gradually developed a substantial commercial potato business which flourished upon a trade with independent stores in the cities of Concord, Franklin, Manchester, and Laconia. However, the increase in chain stores, buying their potatoes out of the State, promised slowly to wipe out this market for local producers.

A contract was made by this group of larger commercial potato men in the fall of 1929 whereby they agreed to furnish one of the three important chain-store companies with all its needs from digging time until the spring months. This involved about 10,000 bushels for stores located in Laconia, Tilton, Franklin, Concord, Manchester, and three smaller towns. They agreed to furnish a high quality potato to the stores as they needed supplies. A price arrangement was made to be based on the Boston market price of one day each week. The company agreed to advertise potatoes received as New Hampshire potatoes.

This plan worked out so satisfactorily to both the producers and the company that another contract was made last fall under more favorable terms to the growers. The arrangement had served in its first year as an outstanding example of orderly marketing, had relieved the markets of 10,000 bushels of out-of-state potatoes, and through competition among stores had created a desire for local-grown potatoes which are of superior eating quality compared to northern-grown potatoes because of a longer maturing season.

The county was faced last fall with the largest crop in years due to a wonderful growing season. New Hampshire's average yield of 215 bushels per acre was second only to Maine in the country. It was somewhat problematical as to whether local growers would be able to market direct to local stores. It was soon found, however, that not only was this one chain store buying native potatoes, but a second large chain had their buyer in the field, and in fact was purchasing nearly all its supplies from local growers. A third chain, which had never purchased locally to any extent, also purchased some potatoes this season. As the season advanced, it was evident that the local markets would absorb all potatoes in farmers' cellars due to this new development.

It appears reasonable to assume that this one small cooperative venture has stabilized the market for growers of the entire section during the 1930-1931 season, and if developed carefully offers a further expansion in potato growing for farmers in this part of the State. This cooperative enterprise has been successful because it met competition with a superior article and has given better service, which we believe is the background for success in any such undertaking.

He boldly asked her father for his daughter's hand.

"Certainly, my boy," replied Pa, promptly. "Take the one that is always in my pocket."—*Capper's Magazine.*

TEXAS APPLIES COTTON FARMING METHODS TO ONION PRODUCTION

Large-scale farming operations, common among cotton planters in the territory, are being applied to the growing of onions in the Corpus Christi section of Texas, according to W. D. Googe, field representative of the Federal Bureau of Agricultural Economics.

The onions were planted with seed direct to the fields in three-foot cotton rows. Cotton planters were used in putting out the seed; tractors and other modern machines were used in cultivation; and one farmer is reported to have harvested, graded, sacked, and loaded into cars a 2,500-acre crop in four days.—*Marketing Activities.*

CANADA BUILDS LARGE CANNERY

A vegetable cannery, which it is reported, will be the largest in the British Empire, is to be established in Essex county, Ontario, at a cost estimated at $1,500,000. The district in which this new cannery is to be built is one of the most productive in North America.

ILLINOIS REPORTS INCREASED DEMAND FOR BUNCHED VEGETABLES

Ten years ago it wasn't nearly as important to tie vegetables in bunches for market as it is now, says J. P. McCollum, Illinois College of Agriculture. Better grading and better handling have brought the change, he says. Bunching is now practiced with all the early root crops, green onions, asparagus, kohlrabi, rhubarb, parsley, leeks, celery, and sometimes sweet corn and various other products of the garden.—*Marketing Activities.*

MODERN MARKETING

Some of the California asparagus crop went to northern markets on the Pacific coast in motor-truck loads refrigerated with solid carbon dioxide this season, say reports to the United States Department of Agriculture. For the 900-mile trip from the Sacramento Valley to Seattle the running time was about 36 hours. One of the trucks hauled nearly half as much as is ordinarily shipped in a carload by rail. Two drivers went with each truck, and they drove and slept by turn.

Intermediate Credit

(*From page* 30)

formed. For instance, 16 have been set up and are functioning in Texas, 3 have been organized recently in the Spokane district, about 25 in the Louisville district, 61 in Arkansas, several new ones in Illinois and Missouri and 2 in the Baltimore district. We find 37 institutions now discounting paper with the bank at Columbia, about 110 with the St. Louis bank, 45 with the one at Houston, 25 with the Spokane bank, 54 with that at St. Paul and so on around the circuit.

Agricultural credit corporations are organized under state laws and should have a minimum paid-in capital of $25,000. There are many, of course, with a capital of $100,000 or more and these larger corporations have more funds with which to hire expert management.

The agricultural credit corporation

receives applications for loans from individual farmers. It looks them over just as carefully as any bank, gets their financial statements and, if they look good and if the farmers have ample collateral in the way of livestock, implements, or sometimes a mortgage or growing crops, the loan is made and the farmers' notes accepted. Such notes are then endorsed by the corporation and sent to the nearest Intermediate Credit Bank for a loan or to be discounted.

Before the Intermediate Credit Bank will do business with a credit corporation it has to approve the latter's financial set-up, management, etc. The corporation usually deposits the value of its stock in government or Federal Land Bank bonds with The Intermediate Credit Bank as a sort of cushion or guarantee of the farmers' notes which it offers for sale or discount. The number of times the amount of the paid-in capital which a credit corporation can discount farmers' notes with The Intermediate Credit Bank depends upon the quality of the security offered and the management of the institution. The credit corporation is permitted to charge as high as 3 per cent, in addition to the rate of interest which is charged it by The Intermediate Credit Bank, on the notes which it discounts with the bank. For instance, the rate which the bank charges now is approximately 4 per cent. This would make it possible for the credit corporation to charge as high as 7 per cent provided that such a rate is legal under state laws.

The Federal Intermediate Credit Banks are located in the same cities as are The Federal Land Banks and are officered by the same individuals. They are willing to indicate to anyone writing to them whether there is a credit corporation doing business in his territory and they are also willing to provide anyone with information concerning the legal steps necessary for the formation of credit corporations under state laws. This is true of livestock loan companies also, there being practically no difference except that the livestock loan company may specialize on livestock paper and not include loans for general agricultural purposes or for production purposes other than livestock. However, some livestock loan companies make general agricultural loans.

Asparagus Ferns

(*From page* 29)

mercial value. One of the best recognized and most successful methods practised by growers in controlling this undesirable type of growth is by the use of kainit at the rate of a ton or more per acre applied in split applications. Growers have found that by using extra potash in the form of kainit, a saving can be made on icing. The sprays are strong and healthy and present a better appearance when they arrive on the market. "Fern rust" can be controlled by the use of kainit as completely as potash controls rust in cotton. *Asparagus plumosus,* being closely akin to the common table asparagus, seems to respond best to potash in the form of kainit salt.

Most any good, well-drained sandy soil is satisfactory for the production of *Asparagus plumosus,* but a sandy loam of medium texture is to be preferred. On richer soils the stems have a tendency to become too coarse and the fronds too far apart. Irrigation is desirable to insure maximum results.

It is necessary to grow the crop under half shade, similar to that required for shade tobacco. Slats are used and are spaced their width apart far enough

overhead to walk under. There are a few ferneries planted in hammocks under large oaks that are filled with Spanish moss.

The fronds are tied 12 to the bunch and are packed in various sized crates. It takes 1,000 fronds to fill a crate 18" x 18" x 32". The crates are lined with newspaper and contain a solid cake of ice wrapped in newspaper.

On account of the heavy expense of installing and keeping up a fernery, the acreage has been kept down to about 1,000 acres, which are located in the central and northern sections of the peninsula proper. Practically all of the fern crop is disposed of in the northern markets, where it is used by florists in making floral designs and in bunches of cut flowers.

Plant Food and Milk

(*From page* 28)

it is, therefore, not surprising that the consumption of fertilizers in Wisconsin and Iowa is increasing at a rate greater than in any other commonwealths in America. Coincident with a wider use of commercial fertilizers, Wisconsin farmers in 10 years have increased the amount of protein feed grown in the form of legume crops 408 per cent. This is assurance that these farmers will continue to compete in our Nation's supply of milk, butter, cheese, and bacon.

Farmers of the Northwest are becoming convinced that from the plowed layer of soil comes most of everything we eat and wear. It has taken nature thousands of years to produce six inches of surface soil. Man can deplete it of its fertility in less than a generation. On the other hand a sound system of animal husbandry supplemented by judicious use of commercial plant food means a permanently prosperous agriculture.

The time has come when commercial fertilizers must be looked upon as a most important means of farm profit. They are not a substitute for any of the old, sound practices of crop rotation and manuring. They are on the other hand, a means which when properly employed will enable the growth of crops at costs so low that marginal land competitors will cease glutting the market. Furthermore fertilizers will enable a farmer to diversify and get good yields of alfalfa and soybeans which are crops that can be turned into profits because a surplus of them has not existed nor is likely in our lifetime.

Peas are another legume cash and silage crop which dairymen employ to reduce butterfat production costs and increase profits. Note the response to an application of complete fertilizer on the left as compared with the untreated part of the field on the right.

Chinese Jujubes

(*From page 24*)

meat, pickles, butter, and, in other ways.

Says Mr. Thomas: "To the American people this jujube, (the Chinese variety) so long known in Asia, is at present little more than a name, but when it comes to be properly appreciated as a delicious fruit and a sure crop for sections where ordinarily little fruit is grown, it will become a valuable asset to these regions. The immediate future of the jujube is in its culture as a home fruit. As such it will appeal not only to the farmer, but to the growers and residents generally in many States. A few jujube trees can well be planted in every home orchard, thus contributing to the variety of fruits by adding one that is highly nutritious, delicately flavored, and an abundant and sure producer."

He Did It This Year

(*From page 6*)

izer tonnage in the 7-7-10 analysis. This happened in 1928, and since that time he has bought nearly 800 tons of the same analysis fertilizer.

In 1927 his average yield per acre on his "Rackety Hall" farm was 73 barrels per acre, and his fertilizer was a 5-7-5 analysis, used at the rate of 3,000 pounds per acre. In 1928, with a 2,200-pound application of 7-7-10 fertilizer, he made 81 barrels of spuds. In 1929 with the same fertilizer application, his average yield jumped to 83 barrels; and in 1930 it went to 87 barrels. This spring (1931) he made the astounding average yield of 101 barrels on every acre on the farm.

"That extra potash did the work," said the Cap'n, "it kept the vines green longer, and gave the plants a better chance to make big potatoes. Lots of little potatoes may weigh more, but it takes the big ones to make full barrels."

In the summer Cap'n Davis grows a tremendous crop of soybeans from which he harvests the seed in the fall. The bushes are plowed under with tractor plows as soon as the seed harvest is over, and in this way he adds tons and tons of organic matter to every acre of his potato land. He has developed quite a soybean seed business as a side-line, and feels that the fertilizer which is left from the potato crop helps him make better than the average bean crop. The tremendous amount of organic matter which is worked into the soil from the soybean vines, gives him the assurance that a good part of his nitrogen is "paid for," and he doesn't worry much on that score. However, by four years' actual experience in doubling the potash, he has proven that "it takes potash, and plenty of it, to make a big crop of potatoes."

"And it's a wonderful tonic for the cabbage crop, too," volunteered Cap'n Charlie. "I was only making average crops while I was using a fertilizer which contained 100 pounds of potash, but since I started using 200 pounds, both the quality and the yield have greatly improved."

It Makes Me Money

(*From page 26*)

us which was fertilized and which was not, and he was always right too. It seems that the potash works on the starch in the corn, some way, and we know that the starches make sugar, so I guess that is the reason the chemist could tell the difference in the two ears we had given him to test out.

"There are lots of things I do not know about commercial fertilizers, but I do know that phosphate and potash pay us big dividends when we use it on our corn. And yet I wouldn't have known this or at least I wouldn't have believed it, if I had not tried it out myself."

The Inquiring Mind

(*From page 20*)

ulant is a substance which, while furnishing no plant food, makes insoluble plant-food constituents in the soil available, while it appears to be furnishing plant food, as evidenced by increasing growth of crops, following its application. Gypsum or land-plaster is a typical soil stimulant.

Sodium nitrate is often regarded as a stimulant, in the sense that its use calls for increased amounts of phosphorus and potassium. Prolonged use of sodium nitrate, or other nitrogenous plant food, without providing any available phosphorus or potassium will, sooner or later, reduce the soil supply of one or the other or both of the latter constituents, to a point where the crop demands may not be absolutely met. Long continued and exclusive use of fresh farm manure may bring about a similar condition.

Relative to the need and use of potassium fertilizing elements, Dr. Van Slyke has said, that larger amounts of potassium are called for by leafy crops, root crops, and some others, than by cereals. Light sandy soils are often deficient in available potassium, while muck soils are generally found to respond most favorably to generous applications. Deficiency of potassium, he says, is often indicated by weakness and brittleness in stalks and leaves.

Potassium compounds appear to enable plants to withstand more effectively attacks of fungus diseases. For example, in the absence of sufficient potassium, wheat is liable to rust. In general, crops which do not receive their full supply of potassium are more liable to disease, and in this condition the resisting power is weakened still more, if the plants receive large amounts of available nitrogen.

Dr. Van Slyke has expressed the opinion that the ideal system of using fertilizing elements, all things considered, is that commonly followed by the most progressive German farmers, who do not apply plant food by formulas or mixtures, but as separate materials. In their system of farming, they apply nitrogen, phosphorus, and potassium separately, usually in different seasons, in accordance with their observations and experience. The successful application of such a system demands a close study, not only of crops, but of the science of plant feeding. It has the advantage of enabling the farmer to make the most economical use of all plant-food material in crop growing.

At the time of his retirement from active service, in 1928, it was said that Dr. Van Slyke's attainments in the scientific world place him among the leaders in research in dairy chemistry. It is largely to his work in this field that the New York Agricultural Experiment Station owes the prestige it enjoys. He will, however, be remembered by the farmers of the State chiefly for his organization and supervision of the chemical inspection of fertilizers and feeding stuffs.

A Trainer of Chemists

Many of the leading agricultural chemists of the country have received training and experience in research in Dr. Van Slyke's laboratories. They include E. L. Baker, A. W. Bosworth, Fred D. Fuller, E. B. Hart, A. L. Knisely, the late E. F. Ladd, J. A. LeClerc, C. W. Mudge, A. J. Patten, W. E. Tottingham, and many others. These noted scientists have carried to other institutions the inspiration to careful and thorough scientific investigation they received from their contact with Dr. Van Slyke.

In home and community life the Van Slykes are said to have been "widely known as lovers of flowers, music, and art, and ambitious for every thing that is high and holy in human life." Dr. Van Slyke is an elder in the First Presbyterian Church of Geneva, superintendent of the

Sunday School, a director of the Y. M. C. A., and is identified with every movement for the civic and moral betterment of the city.

Despite the fact that, to some, he may have appeared somewhat austere, like Shakespeare's Justice who had "eyes severe, and a beard of formal cut," there is a genial side to Dr. Van Slyke's nature. Although intense and emphatic in his likes and dislikes, he has been accounted "courteous, patient, and of a kindly, good-natured tolerance of youthful enthusiasm which has long been appreciated. His highly developed sense of humor and keen wit have often brought relief to intense situations." We have been told that it was one of his sources of pleasure, in earlier years, to join the young men of the staff in playing tennis on the court maintained by them, and there he always was a good sportsman. Further, he sings bass well and has been active in community and church singing.

An Inspiration to His Associates

Dr. Thatcher wrote that when, years ago, he consulted Dr. Van Slyke relative to insecticides and fungicides, his kindly suggestions and ready sympathy and advice were a great help. He came away from the interview "with the impression that research on economic problems ought to be based on sound understanding of the scientific principles involved," and his association with the Doctor in recent years has confirmed his earlier impressions that he represents the true scientist in the service of agricultural and industrial development.

During his 38 years of active service, Dr. Van Slyke kept himself "fit" by regular physical exercise by working in his flower and vegetable gardens. In 1925 he was said to be "as strong and active as he was 20 years ago," and it was hard to realize that the time was nearing when the State retirement regulations would force him to drop his active connection with the chemical research work of the Geneva station. "We know," said Dr. Thatcher, "that when that time comes there will be no one who can do just what he has done, and that his influence will be felt long after his active work is finished. Devotion to chemistry for its scientific value, as well as for its industrial applications, has marked his whole life-work, and his happiness in it, through these later years of service, is a constant inspiration to the younger members of the staff."

That Dr. Van Slyke has been able perfectly, on occasion, to throw off the serious and dignified mien of the scientist, and engage heartily in the social doings of the community, is well evidenced by a pleasing episode recounted, in 1925, by Dr. Thatcher. He tells us that the annual Christmas party for members of the families of the staff of the New York State Agricultural Experiment Station was in progress. From behind the Christmas tree came the jingle of sleigh-bells. Out popped a plump jolly Santa Claus with a natural gray beard which the older members of the faculty recognized. But the children gazed in fascination while Santa proceeded to dance a gay jig in time with the music from a hidden Victrola, and then in astonishment as the gray-bearded saint executed in rapid succession all of the "daily dozen" stunts which keep one's body vigorous and nimble, in spite of advancing years. Finally his peaked cap slipped a little to one side and one of the children cried "Why! It's Dr. Van Slyke!"

That was the Doctor, when 65 years "young," as his friends at the Experiment Station know him.

Versatile Van Slyke! Stern scientist of the laboratory, pious pillar of the church, kindly leader of the Sunday School, jovial center of the Yuletide festivities, harmonious singer of songs, admiring lover of nature! He is taking things a bit easier now, and richly deserves a rest. May the sunset days of his purposeful life be blessed with happiness and health.

Taking Time Out for Recreation

(*From page* 15)

of farm boys are being built in new movements, for instance, in Wisconsin where the Junior Forest Rangers have adopted the saying, "Let Boys and Trees Grow Up Together."

Growing up in the shadows of tall pines and stately oaks gives the farm boy no smaller ability for appreciation of the clouded splendor of our city's skyscrapers, but it does build up within him a lifelong love of what is basic in the existence of the entire country, the soil and what she nurtures.

Kilmer said,

"I think that I shall never see
A poem lovely as a tree . . ."

He might have included a lot of other things in addition to a poem. Sometimes we forget, but seldom doubt, the truth of such a statement, and when we do, why not abide by the thoughts of ex-president Coolidge and take a vacation, give the mind a chance to dwell on other things—out among the trees, streams, and lakes, out where the farmer and his cane pole may show the county agent and his shining new tackle a few old tricks in the art glorified by Izaak Walton.

Getting Ready for the Fair

(*From page* 17)

rent season. There are some exceptions in fairs which are held real early in the season before certain crops are matured and ready for showing.

There are certain exhibits which have particular requirements. For example, potato exhibits should never be washed or brushed so as to make blemishes on the skin. Most judges will rule out any exhibit of potatoes which has been washed. Most fairs have two classes for potatoes, one for seed stock and the other for table stock. This latter should be larger than the seed potatoes. In general, a potato for table stock should be from 8 to 10 ounces in size, while the seed stock should be about 4 to 6 ounces. Potatoes which do not conform to the requirements of the No. 1 Federal grade should not receive a ribbon at a fair.

A desirable sheaf of oats.

The requirements for No. 1 potatoes may be obtained from any agricultural college or the United States Department of Agriculture.

Maybe the most skill in the exhibiting of crop material comes in the preparation of sheaf samples. These sheaf samples go a long way in the making of a beautiful showing for crop exhibits. Many very fine sheaf samples have some minor defect, such as a slight mixture of varieties or a small amount of disease which lowers their standing. It is important in a sheaf sample to have large heads of good quality and clean straw. Many times the beauty of a sheaf is marred by broken, discolored straw.

In general there are two classes of sheaf material, one is the grain sheaf and the other is the grass or forage sheaf. Grain sheaves are usually 4 inches in

diameter and tied in three places. The shape of the heads is not important and may be round like a ball, acorn, or oval in shape. It is important that all of the leaves be removed and that the string holding the grain together be covered with one-inch ribbon.

Forage sheaves such as the various grasses, alfalfa or clover, require more skill to make than grain sheaves. It is very important that the forage sheaves have a good, dark green color and that all of the leaves are present.

Growers should collect their material early, store it in the proper place, and not let it become tangled if they hope to get good sheaves.

Fertilizing the Apple Orchard

(*From page* 12)

mercial fertilizers, commonly a 4-8-10, and still others a combination of these two methods, that is, our fruit growers were fertilizing their orchards much the same as they were fertilizing their field crops. Now that it is understood that an apple tree requires less phosphoric acid and potash and relatively larger amounts of nitrogen than farm crops, the limiting factor then in our system of orchard fertilization was nitrogen.

Again, as previous to 1914 we were applying phosphoric acid and potash, and these elements are non-leaching from our soil (about the only way they can be removed is by means of plant roots), a large reserve of these important elements had been built up in our orchard soils. Hence, when the nitrogen-only system of orchard fertilization was adopted, a correct balance was obtained between the nitrogen applied annually and whatever amounts of phosphoric acid and potash that were needed to balance it from the accumulated phosphoric acid and potassium we had previously built up in the soil, and an increased production of fruit resulted.

This system of nitrogen-only fertilization has now prevailed for some time without any applications of phosphoric acid or potash to add to the reserve of these materials that were built up in pre-war years, hence it is likely that these reserves of phosphoric acid and potash have become, or are fast becoming, depleted and that the amounts rendered available from the natural unavailable stores in the soil are too small to balance the large quantities of nitrogen that are now annually applied to our orchard soils. Therefore, perhaps now or in the near future, these substances will be the limiting factor in orchard fertilization.

Again let us look at the results obtained when an approximate 4-8-10 fertilizer was applied in varying amounts of 400, 600, and 800 pounds per acre. (See Table III.)

TABLE III. — EFFECTS OF COMPLETE FERTILIZER ON APPLE TREE PRODUCTIVENESS, VARIETIES, GRAVENSTEIN AND WAGNER. EIGHTEEN YEARS' RESULTS.

Plot	How Fertilized	Average yield per tree since planting: Gravenstein	Wagner	Av. yield two varieties since planting	Total yield per acre since planting	Av. annual yield per acre since planting	Total cost of fertilizer since planting	Value of apples at $2 per bbl. tree run	Value of apples, less fertilizer
		bbls.	bbls.	bbls.	bbls.	bbls.	$	$	$
6, 11, 14, 26	None	8.55	4.03	6.29	339.66	18.87	.....	678.32	679.32
7	400 lbs. 4-8-10....	8.62	11.00	9.81	529.74	29.43	107.33	1059.48	925.15
8	600 lbs. 4-8-10....	12.73	5.50	9.12	492.48	27.36	160.99	984.96	813.97
12	800 lbs. 4-8-10....	15.48	8.58	12.03	647.62	35.98	214.66	1295.24	1080.58
	400 lbs. 4-8-10 =	92.3 nitrate of soda;		215.4 superphosphate;		92.3 muriate of potash			
	600 lbs. 4-8-10 =	138.5 nitrate of soda;		323.0 superphosphate;		138.5 muriate of potash			
	800 lbs. 4-8-10 =	184.6 nitrate of soda;		430.8 superphosphate;		184.6 muriate of potash			

TABLE IV.—COMPLETE FERTILIZERS INCREASED THE YIELD OF WEALTHY AND FAMEUSE IN ORCHARD OF A. W. BUZZELL, ABBOTSFORD, QUEBEC. TREES 25 YEARS OLD AT BEGINNING.

Fertilizer applied, pounds per tree.	Annual yield per tree						
	1925 bus.	1926 bus.	1927 bus.	1928 bus.	1929 bus.	1930 bus.	Av. bus.
Nine trees Wealthy—							
Nitrate of soda, 6	...	8.60	1.54	6.61	4.55	5.75	5.41
Nitrate of soda, 6; superphosphate, 5	...	6.23	4.51	6.83	8.28	3.58	5.87
Nitrate of soda, 6; superphosphate, 5; muriate of potash, 1	...	9.67	2.71	10.28	9.28	6.17	7.62
Twelve trees Fameuse—							
Nitrate of soda, 6	1.12	13.97	0.04	12.04	0.37	13.62	6.86
Nitrate of soda, 6; superphosphate, 5	2.45	12.41	2.10	13.75	3.50	12.10	7.78
Nitrate of soda, 6; superphosphate, 5; muriate of potash, 1	0.87	16.02	0.21	16.46	1.08	16.90	8.59

Complete Fertilizers Complete Yield

It will be noted that as the application of this 4-8-10 fertilizer was increased from 400 to 600 to 800 pounds per acre the yield of the Gravenstein variety increased in proportion to the amount of fertilizer used. The Wagner yields were variable owing to the wide range in vigor and productiveness of the individual trees even under identical treatment. However, in taking the average of the two varieties it will be seen that wherever the fertilizer was used an increased yield was obtained over the non-fertilized plots. I may say that the results of this experiment check with an experiment conducted in a sod orchard at Abbotsford, Quebec, the results of which are shown in Table IV. In this orchard the soil upon analysis prior to the beginning of the test gave 0.77 per cent of nitrogen, 0.32 per cent of phosphoric acid and 1.98 per cent of potassium, and although this soil was relatively high in the essential minerals the highest yields were obtained where a complete fertilizer was used.

Dates of Application of Orchard Fertilizer

To determine by experimental tests the proper time in the spring in which to apply orchard fertilizers, a test was started in the spring of 1924. Three rows of 9-year-old MacIntosh with Wagner fillers were selected for uniformity of soil and growth. The soil where this orchard is growing is above average fertility, as will be later shown by the records from the unfertilized plot. The first row was put down to sod or grass mulch; in the second row a sod strip was maintained on either side. The third row was cleanly cultivated to July 1 and a cover crop allowed to grow from then to late autumn.

Each of these three rows was then divided into 4 plots of 5 trees each, number 1 being check, number 2 fertilized on April 25, number 3 fertilized on May 17, and number 4 fertilized on June 8. The fertilizer mixture from 1924 to 1928 inclusive was 150 lbs. nitrate of soda, 300 lbs. superphosphate, and 50 lbs. potash, applied at the rate of 5 lbs. per tree each year.

During 1929 and 1930 the mixture was our regular orchard mixture of fertilizer of 200 lbs. nitrate of soda, 200 lbs. sulphate of ammonia, 300 lbs. superphosphate, and 100 lbs. muriate of potash. This mixture was applied at the rate of 8 lbs. per tree each year. Table V records the data secured from this test during the past seven years.

It will be observed from the table that the best average results were from the June-8 application. Why is this? My explanation would be as follows: April 25, this application is made usually while the soil is still saturated with surface water which when it eventually drains away leaches a large proportion of the available nitrogen with it from the soil; then again, it is applied usually before the growth of the tiny hair fibre feeding roots have developed sufficiently to absorb and store up any of this plant food from the rapidly disappearing surface drainage.

TABLE V.—DATES OF APPLICATION OF FERTILIZERS, 1921-1930. VARIETY, McINTOSH, 7-YEAR AV. PER TREE IN BBLS.

Orchard Culture	No Fertilizer	Fertilizer applied April 25	Fertilizer applied May 17	Fertilizer applied June 8	Av. yield per tree	Av. annual Yield
	bbls.	bbls.	bbls.	bbls.	bbls.	per acre
Grass Mulch	8.31	11.11	12.55	14.68	11.66	44.97
Sod Strip	11.98	15.03	13.43	19.76	15.05	58.05
Clean Cultivation	13.47	11.63	11.94	12.10	12.28	47.37
Average	11.25	12.59	12.63	15.48		

The May-17 application is applied at a time when the tree is bursting forth in full vigor, shoving out its new terminal growth, developing its leaves and flower buds, in fact its every department is working to capacity and each department requires abundance of plant food. It is not probable that in this struggle for development the trees may use up all the nitrogen applied on May 17 before the fruit buds attain their maximum development, and before nitrification within the soil becomes really effective. Then it is reasonable to suppose that in the orchard receiving the June-8 application, with the trees usually at the full-bloom stage at this date, the nitrate of soda in the mixture applied, being immediately available when once dissolved in the soil moisture, would be quickly taken up to the rapidly developing embryos of the tiny apples and give them the pep necessary to stimulate the set after which the balance of the fertilizer and the nitrification of the slowly available forms of nitrogenous substance would carry the crop along to maturity.

It will be noticed also from this table that the average annual yields per acre are in favor of, first: sod strip; second, clean cultivation; and third, grass mulch.

It is an accepted fact or belief that a sod orchard soil is richer in total nitrogen than a cultivated soil, but this nitrogen is in a comparatively unavailable form until soil bacteria and chemical changes render it available, which is as I have stated after the soil becomes warmed up and bacterial life becomes active.

The early cultivation of the soil outside of this sod strip aerates and warms it up, thereby aiding in nitrification of unavailable forms of nitrogen and rendering possible other chemical changes that may be necessary to make phosphoric acid and potash quickly available to the growing tree.

These now available forms of plant food, particularly nitrogen, are quickly taken up by the tree and utilized in developing the various phases of tree growth, particularly the fruit buds. Then this reserve of nitrogen in the sod strip, becoming gradually available, gives the "follow through" effect and larger yields.

The clean cultivation method falls down in yield and in two different ways: theoretically by a burning up or depleting of the humus content of the soil by frequent cultivation, thus destroying the most efficient agent for storing or holding in reserve for future use the plant food and moisture of the soil. But in practise the clean cultivation method has given us lower yields because of the fact that to practise clean cultivation it is necessary to head trees higher, and in so doing, the removal of the low branches reduces the size of trees below that which gives the largest, well-exposed bearing surface per acre.

Be it understood that in these three methods the trees were all fertilized alike. Had the grass mulch plot received an increased quantity of quickly available nitrogen, as is recommended for grass mulch orchards, the results might have been different. However, let it be understood that there is a vast difference between a sod mulch and a sod orchard. Remember that a sod mulch orchard, if practiced, to be profitable must be sod mulch culture, with all that those words imply, not

"sod neglect" as is too often the case. The grass mulch or sod orchard is not recommended in our Annapolis Valley, excepting in a few very favored locations, but sod mulch orchards are giving very good accounts of themselves in many localities. A sod mulch must, to be successful, be sufficient to suppress all growth of grass or weeds under the trees, when it will be sufficient to effect control of soil moisture.

Mulching material necessary is 200 lbs. of mulch material per tree or from 2½ to 5 tons per acre, with an additional 100 lbs. per tree once in every 3 years.

The Fertilizer Used at Kentville

The orchard fertilizer mixture used at the Kentville Experiment Station during the last few years is composed of the following mixture:

200 pounds nitrate of soda, 15% nitrogen,

200 pounds sulphate of ammonia, 20% nitrogen,

300 pounds superphosphate, 16% phosphoric acid,

100 pounds muriate of potash, 50% potash;

analyzing 8.77 per cent nitrogen, 6 per cent phosphoric acid and 6.2 per cent potash.

These chemicals are thoroughly mixed and then applied at the rate of 450 to 600 pounds per acre according to age and productivity of the tree. The fertilizer is largely sown by hand at the rate of 8 to 10 pounds, carefully distributed about the tree to slightly beyond the spread of the tree's branches. The fertilizer is applied about mid-May or when the trees are just showing a tinge of green from the newly formed leaves. In this mixture it will be seen that the nitrogen is applied in two forms, nitrate of soda and sulphate of ammonia. The former being quickly available aids in the development of the various tree activities at the start while the latter carries on after the nitrate of soda has been used up.

To those orchardists who like to experiment, particularly those adopting sod culture, it would seem advisable to apply their complete fertilizers to their orchards as early as the soil conditions will permit, that is, after all surface water has drained away and the soil is dried out and firm in the spring. Then later when the trees are at the pink-blossom stage to apply a top-dressing of from 100 to 150 pounds of nitrate of soda per acre to aid in fruit setting.

Sacred Cows

(*From page* 4)

opened their eyes a trifle wider when Mr. Legge first assumed rural economic prominence, and followed hard after him sowing tares in the wheat fields he wanted to limit in size for temporary relief.

These herdsmen of the sacred cows are vigorous as ever, and by their very impudence and bitter-ender attitude they give the aid and comfort to the opponents of agricultural solidarity in nearly every State where cooperation has reached any magnitude. It is in the State departments of marketing and cooperative organization where the sniping is going on at a terrific rate, with these old wheelhorses doing the dog-in-the-manger.

Let anyone venture to suggest certain advisable changes in legal set-up or business practice for one of these sacred cow locals, that would tend to hinge them to the door of greater opportuntiy through national farm control, and see what comes of it!

In a Midwestern State there is a co-

operative built up by a valiant farm leader who died in the harness. For ten years this farmers' agency has posed as a marketing company for a few hundred locals in two States, when in reality it is nothing more than an assembling unit of rather loose power. Reams of stilted praise, verbal fireworks, and undeserved tribute have been spilled in behalf of this time-marking group. When a well-informed writer who had followed the history of this group on the farm side for a decade decided that a little stimulation would be good medicine for this sacred cow, he approached a few of the leading local officers of one of its branch divisions. He asked if a little judicious and well-meant criticism of a constructive kind might not pry up the lid of the feed-box on which the herdsmen of this sacrosanct beast were seated.

Up went the hands of the hearers in horror. *"Lèse majesté!"* Such a broadside of criticism would undo the campaigns of many months over bad roads and give the rival independents a stranglehold on the business. "Do this and you lose caste as a respected farm journalist," was their final warning, accompanied by fluent gestures and weighty frowns. And so it is in this way that the hands of those who have a real unbiased perspective of co-operation are tied fast to their sides with a straight-jacket made of provincial strands.

IN this same territory and embracing two of the largest creamery States are two or more federations of farmer-owned plants. It is quite within their scope and power to unite across the State lines and dovetail into the Farm Board program for the first step in dairy stability and independence. But for nearly eight years the rival clans, led by mossy local patriarchs, have clung to predigested opinions and obtruded small reasons why "self-determination" is the best road to destiny.

Evidence of the ability of farmers in adjacent counties or the next State to erect a national dairy sales company of sterling worth and market power only inflames the embers of their smoldering animosity. It is out in these by-paths that the missionaries of farm salvation through federations and contracts must spread their gospel tents and provide their mourners' benches.

Not content with Gandhi's passive resistance theory, some of the sacred cow jockeys in the above daily dilemma used their pull and prejudice among the members of the legislature in 1931, trying to unseat the commissioners and bureau heads who had been working with the Farm Board on a little larger line of action than the provincials desired.

As a consequence of this hesitancy to let go of old traditions of doing business, there has grown up a rather baffling complex of legal business, induced by contract breaking on the part of members who signed up in some campaign and have since listened to the ancient prophets and remorseless objectors.

SO we have a few legal specialists taking on the business of sewing and suing. They help to sew up the members in contracts and sue them for breaking them. Indeed some of these talented lawyers have found the agricultural problem a richer stew than any judicial pot that ever boiled over.

Here is one lawyer of ability leading a cooperative sales company and getting judgments against individual members who yield to the wiles of independent buyers for selling goods outside of the pool. Just as quickly he cracks the whip in the opposite direction, and sues and secures judgment on a large farmers' cooperative which fails to render acceptable service on an iron-clad contract with individual members.

Therein he probably renders all a lesson, albeit a costly one. He shows them that there is no magical open

sesame to this business of banding together to sell a common product of graded quality for a going price. He teaches them that a guarantee to deliver and a contract to accept and sell is more vital than a mere membership agreement in some hectic society of agricultural protest.

This harks us back along an old, moss-grown, verbally decorated trail.

The sweaty spellbinders and the open-mouthed auditors at schoolhouse rallies talked vehemently and to some pioneer purpose on the value of getting the tillers of the soil as well healed as the tellers of the gold. Their era was the torchlight epoch in agricultural unity. They called the men with too much log-cabin individualism into a realization of modern industrial cohesion.

These were the chaps who set the prairie fires and woke the backwoods clearings to the movement which finally enthroned these latter-day saints of the stand-pat order. They organized almost too well, with the result that in a few years the mails were flooded with manifestos and appeals from several rival State and national farm societies, and Washington, D. C., became the great jousting place for knights-errant from every agricultural bush-league in forty-eight States.

Right now in many States no serious State-wide conference may be called for a uniform farm movement unless notices are carefully sent to a score of rival leaders, who come in with eyes bent inward and ears fanned outward. They will not consider much of anything that divorces them from a coign of vantage or reduces their own membership by any threat of alienation or of secondary position. They shake hands all around, listen to a few speeches and thrice-told tales of agonized agriculture, pass a few meaningless resolutions, and return home to spread the seeds of sedition again.

Therefore, whoever bemoans the fact that farmers are not organized and will not stay organized has only nibbled at the crust of the problem. He doesn't know the half of it. Agriculture is so mighty well organized on the wrong plan and bulldozed by so many ingrowing thinkers that any varnish put on the upper surface of the job will peel off until the pits and scales are removed from below. That's why the Farm Board can't tame the "thundering herd." There are so many sacred cows driven by rural "rustlers."

We have no disposition to claim that any and all overhead schemes offered to the rank and file are absolutely sound. But as long as the argument runs rife and the teams that we depend upon to pull the load are yanking and fretting in the harness, it will be next to impossible for *any* plan to be tried for any length of time.

My friend Robin Hood, of the national cooperative council, always glad

to carry the ensign afield, says that large-scale cooperatives have increased their volume of business over 28 per cent since the establishment of the Farm Board. They also click up an added membership of 33 per cent despite a drop in farm morale. Furthermore, he finds that in the face of a decline of 18 per cent in commodity prices on farm goods, the value of the produce sold by these same larger cooperatives has increased nearly 5 per cent since the Farm Board's administration.

ALL this is mighty encouraging and speaks well for the hired employes of the various federations and pools, whose main job has been to bushwhack hard against the feudalists out in the sticks, always gunning for the spirit of unity against the prejudice of provincialism. But to many of the old bewhiskered jehus aforementioned, those added dollars secured a mile off from home look small beside the nickels tinkling in their overall pockets. They reply that the intervening costs of operation and overhead eat up all the paper profits. They refer to deal with some old-timer they know, although they are aware he is abusing their confidence at every turn.

We insist that a frank clinic for sacred cows would mend matters in a few distressing particulars. Some of them have economic t. b. so bad the stockyards would send them to the tank. Others suffer from bloat and lie supinely in distress. Yet more of them actually have cooperative abortion in a mild form. The stables in which these critters are kept require whitewashing and disinfection. The ration is unbalanced and the hay is moldy. If a vet is required, he is often of the quack variety with nostrums and cure-alls that send the victim still further down in the musty straw.

'Tis true that the main herd of purebreds kept on the main thoroughfare is well housed and fed, with fairly good caretakers graduated from approved institutions. Cooperation in those herds yields a full pail of nutritious liquid, not too frothy.

Cooperation itself, then, faces the same test exactly as faces animal husbandry. We have only a small percentage of tested cows and purebred animals, and a lower supply of proven sires. The best ones go on the fair circuit and win ribbons, while the "average" herd is still pretty much a mongrel outfit, taking the nation over.

Our chief consolation is that "things are better than they used to be." Maybe that hope will gain momentum with the rise of the youth movement, trained to work in closer harmony and follow a little more daring paths.

It is still true and probably shall so remain that one cannot force any movement ram-rod down the necks of a harrassed people. But if perchance the people study sword-swallowing as a profession and get in tune with the times by natural choice, it will be possible to accomplish this without a giraffe-necked race.

SPEED and inertia are opposite elements of force, I presume. You and I shall not live to observe the wholesale union of all farmers in one glorious ensemble. Yet one by one some of the old leaders are leaving the field, giving place to younger and speedier ones. While this in itself is no absolute guaranty that the new leaders will all see things alike, they will doubtless have less to disagree upon in minor ways.

Our hope is that this gradual improvement of personnel will set a higher standard in our cooperative herds. The butterfat test of cooperation, as well as the acidity and sediment tests, ought to go up a notch under a more general adoption of better management.

But best of all therein, there will be fewer sacred cows kept on the premises for sentimental reasons.

VERY CONSIDERATE

"Yous a liah," said Cal.

"Say dat again," said Wash, "and I'll bust yore jaw."

"Considah it said again."

"Considah yore jaw busted."

First Charlady: "You know, dear; what do you call those drawings that are all scratched?"

Second Charlady: "You mean itchings, don't you, dearie?"—*Tit-Bits* (*London*).

Here's one about a census-taker. He pushed his way through a crowd of children and began asking the colored lady questions.

"What's your husband's occupation?" he asked.

"He ain't got no occupation. He's dead. He passed away fo'teen yeahs ago, suh."

"Then who do all these children belong to?"

"Deys mine, suh."

"Why, I thought you said your husband was dead?"

"He is, but Ah ain't."

ONE FOR EACH

A firm of solicitors rang up a stockbroker, and the following conversation took place:

"Good morning, are you Mr. Denman?"

"Yes, who is this?"

"This is Hullett, Crafting, Studge, Minardy, Gowle, and Scarrow."

"Oh, good morning, good morning, good morning, good morning, good morning, good morning."

JUDGED BY TASTE

Mark Twain refused to play golf himself but he once consented to watch a friend play. The friend was rather a duffer. Teeing off, he sent clouds of earth flying in all directions. Then to hide his confusion, he said to his guest:

"What do you think of our links here, Mr. Clemens?"

"Best I ever tasted," said Mark Twain as he wiped the dirt from his lips with his handkerchief.

A Negro was pleading his own case to save the price of a lawyer. He called the chief witness to the stand and said, "Joshua, where was I when we stole dose chickens?"

Teacher (to new pupil): "What is your father's name, dear?"

New Pupil: "Daddy."

Teacher: "Yes, dear. But what does your mother call him?"

New Pupil: "She don't call him anything. She likes him."

A Scot who was a bad sailor was crossing the Channel. He went to the Captain and asked him what he should do to prevent seasickness.

"Have you got a sixpence?" asked the Captain.

"Ay," replied Sandy.

"Well, hold it between your teeth during the trip."—*Boston Transcript.*

There is nothing more pathetic than a horse fly perched on an auto radiator.

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